GEORGIA INSTITUTE OF TECHNOLOGY — OFFICE OF CONTRACT ADMINISTRATION

PROJECT ADMINISTRATION DATA SHEET

[x] ORIGINAL [ ] REVISION NO. _____

Project No. A-3837 GTRI/~~GXX~~ DATE 5 / 15 / 84

Project Director: Robert A. Moore ~~GSMS~~/Lab STL

Sponsor: RCA Service Company; El Paso, Texas 79936

Type Agreement: Purchase Order No. G255356-J62D (under U.S. Army Prime DAAH01-83-C-A282)

Award Period: From 4/25/84 To 7/9/84 (Performance) 7/9/84 (Reports)

Sponsor Amount:	This Change	Total to Date
Estimated:	$ 24,500	$ 24,500
Funded:	$ 24,500	$ 24,500

Cost Sharing Amount: $ _____ Cost Sharing No: _____

Title: "Repair of XM-08 TAR Antenna"

ADMINISTRATIVE DATA — OCA Contact Lynn Boyd x4820

1) Sponsor Technical Contact:

2) Sponsor Admin/Contractual Matters:

Mr. George Schwind
RCA Systems
P. O. Box 3316
El Paso, Texas 79936

Defense Priority Rating: DO-A2 Military Security Classification: n/a

(or) Company/Industrial Proprietary: n/a

RESTRICTIONS

See Attached ----- Supplemental Information Sheet for Additional Requirements.

Travel: Foreign travel must have prior approval – Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of $500 or 125% of approved proposal budget category.

Equipment: Title vests with sponsor, however, none proposed.

COMMENTS:

Sponsor I. D. #01.217.000.84.010

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FORM OCA 4:383

GEORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

Date 9/20/84

Project No. A-3837 ~~School~~/Lab STL

Includes Subproject No.(s)

Project Director(s) was Robert A. Moore/ has been changed to Jack Bridges GTRI / ~~GIT~~

Sponsor RCA Service Company; EL Paso, Texas 79936

Title "Repair of XM-08 TAR Antenna"

Effective Completion Date: 7/9/84* (Performance) 7/9/84* (Reports)

Grant/Contract Closeout Actions Remaining:

- [ ] None
- [X] Final Invoice or Final Fiscal Report ASAP
- [ ] Closing Documents
- [ ] Final Report of Inventions
- [ ] Govt. Property Inventory & Related Certificate
- [ ] Classified Material Certificate
- [ ] Other

*However, George Scwind of RCA has verbally approved charges incurred in July after this date, as long as final invoice is received by 9/30/84. (rc'd 9/19/84)

Continues Project No. Continued by Project No.

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Form OCA 60:1028

A-3837

GEORGIA INSTITUTE OF TECHNOLOGY
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

FINAL REPORT
PROJECT A-3837

BY
J. M. BRIDGES

R.C.A. PURCHASE ORDER NO. G255356-J62D
(Under U.S. Army Prime DAAH01-83-C-A282)

August 1984

Prepared for
RCA Service Company
Site Monitor
East Montana Avenue
El Paso, Texas 79936

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. Introduction

This report presents the repair of Surveillance Antenna (XM-08 TAR Serial #2) Assembly No. A-1982-8033-M5 and the results of the project conducted by the Engineering Experiment Station, Georgia Institute of Technology, for RCA Service Company under Prime Contract DAAH01-83-C-A282. The repair covered a period from May 1984 through July 1984.

2. Inspection and Corrections Resulting from Inspection

2.1 Waveguide Switch Shuttles. No arcing was discovered on the shuttles.

2.1.1 All guide bearings in the waveguide switch shuttles were worn slightly. These were replaced to reduce the chance of a contact of the shuttle to the housing, which would result in slow switch speed.

2.1.2 The switching speed was checked before any corrections were made. It was found that the bottom switch was sticking in the mid-to-rest movement. This was corrected by replacing the short cylinder and replacing the "O" ring in the long cylinder. Care should be taken to use the proper oil in the oiler for the cylinder air supply.

2.2 Damaged main power supply waveguide section going from Switch #2 (bottom) to Switch #1 (top). This section of waveguide was damaged to the extent that neither flange would line up on the switch flange. After repairing or replacing parts of this waveguide, a guard (Figure 2) was installed to protect this waveguide when placing the antenna in the stowed position.

2.2.1 During the inspection it was noted that the waveguide section that was discussed in Section 2.2 was assembled with no "O" rings between flanges; these were replaced.

2.3 The pneumatic system was modified to conform to pneumatic Diagram (Figure 4) which allows the pilot valve to properly seat the solenoid valves before main pressure is applied to switching cylinders.

2.3.1 The control solenoid valves were cleaned and repaired. Parts were replaced as needed.

2.3.2 Air cylinder exhausts were found to be plugged with paint. This will cause the switches to operate slowly. The exhausts were replaced.

2.3.3 The air compressor and tank were replaced with the new design cylinder compressors and a stainless steel tank. Purge valves were installed so that the air tank could be drained in any position.

2.4 A purge valve was installed in a section of the waveguide, so that the waveguide, horns, and radome could be purged with dry air to remove moisture from the system.

2.4.1 A guard was added (Figure 3) to protect the purge valve and waveguide.

2.5 The flexguide and boot were checked. It was found that the flexguide was in good condition, but the boot was in bad shape. Therefore, it was replaced.

2.6 The radome was damaged by high power arcing. This radome was replaced. Figure 1 shows the area burned on the old radome.

3. Results

3.1 Switching speeds tabulated in Table 3-1 are expressed in milliseconds.

3.2 VSWR patterns covering the operating band are shown in Table 3-2. This data shows both before and after repairs. Patterns are reproduced in the Appendix.

3.3 Far-field patterns are reproduced in the Appendix. These patterns show refurbishment, before and after. These are also listed in Tables 3-3 through 3-8.

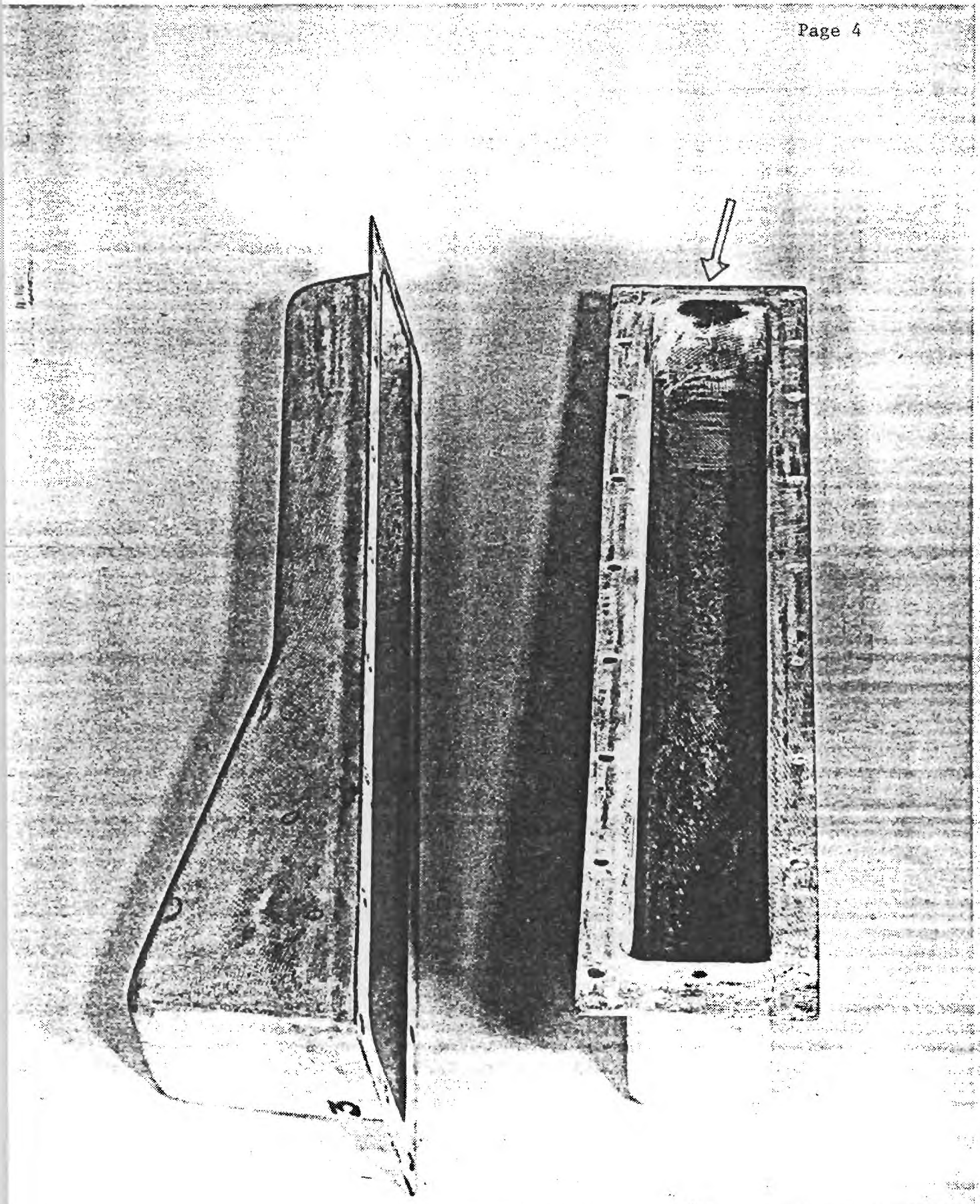


FIGURE 1. PHOTOGRAPH SHOWING BURN DAMAGE.

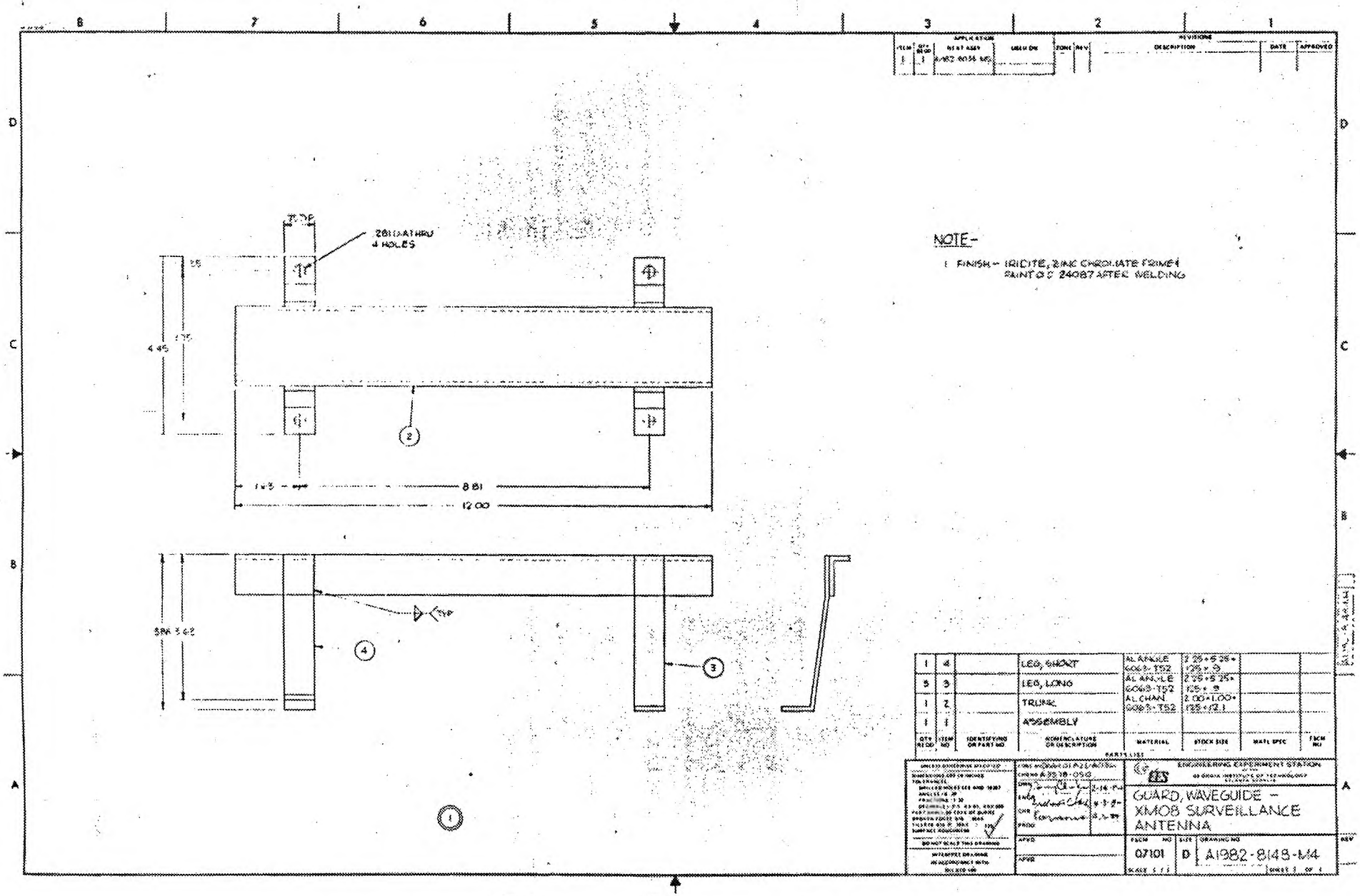


FIGURE 2. WAVEGUIDE GUARD

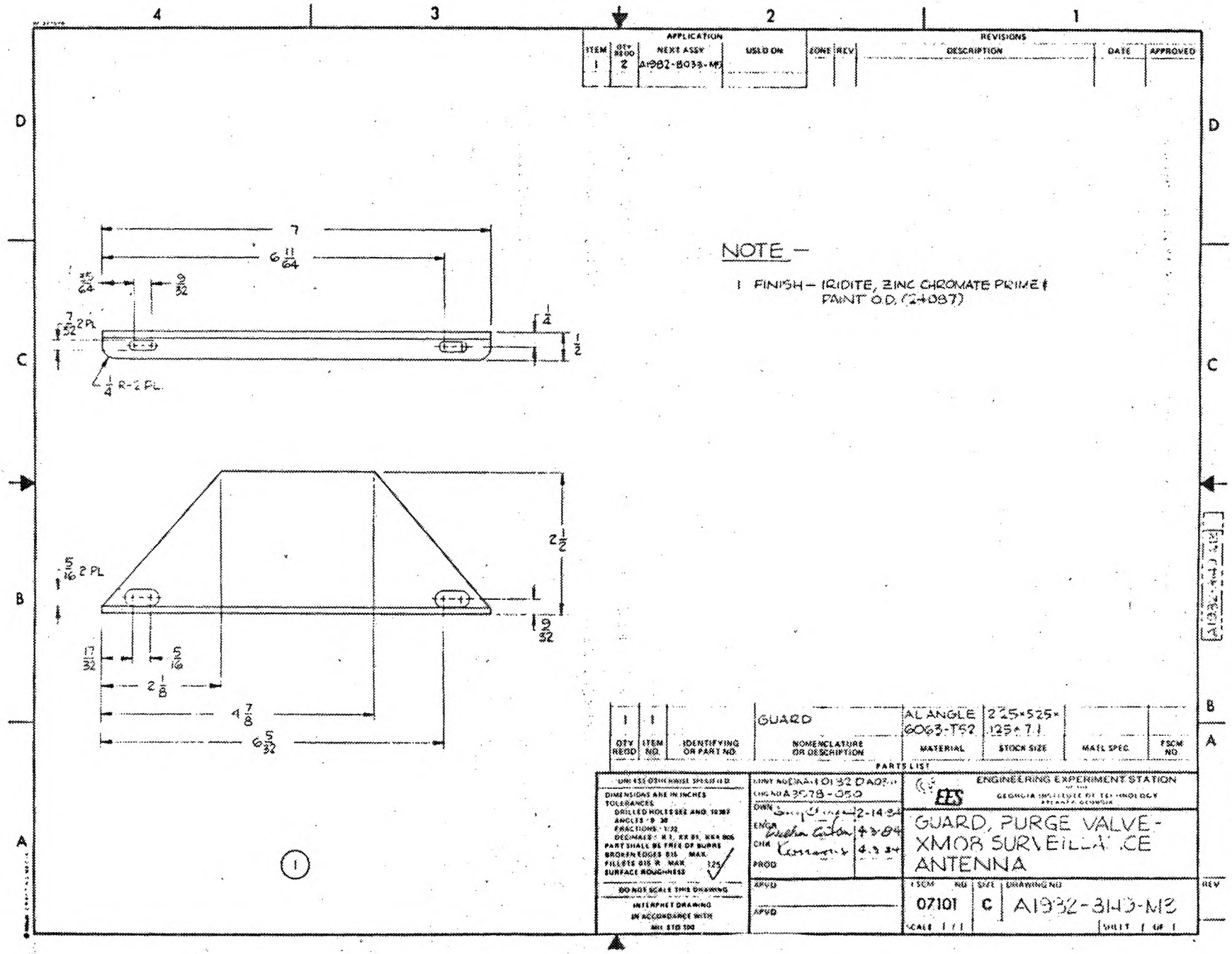


FIGURE 3. PURGE VALVE GUARD.

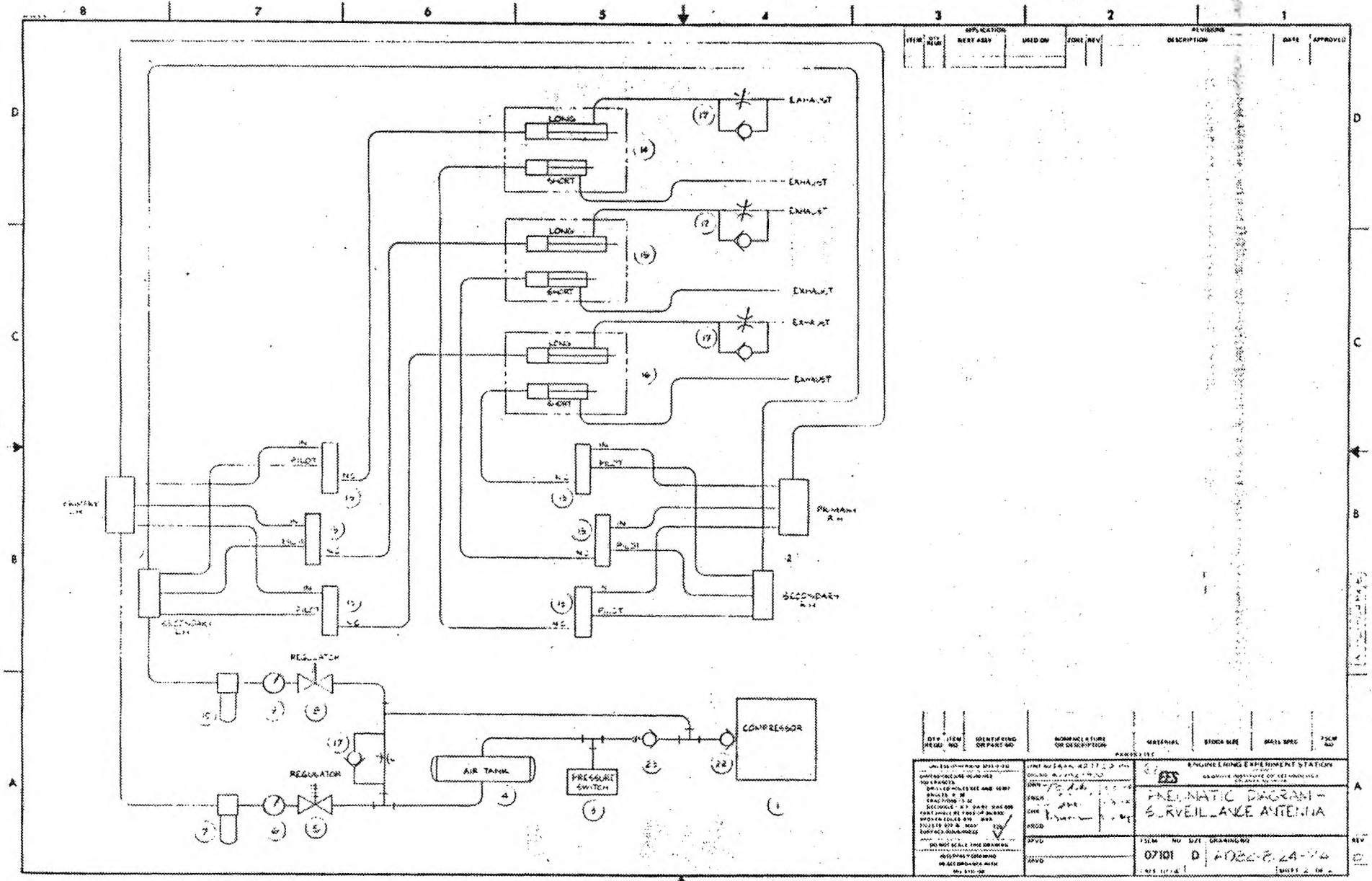


FIGURE 4. SCHEMATIC OR PNEUMATIC SYSTEM

Table 3-1
Switching Speeds For TAR #2 Waveguide Switches
(milliseconds)

Switch Action*	Top Switch	Mid Switch	Bottom Switch
R → M	148	140	108
M → R	124	140	140
R → F	116	120	120
F → R	136	148	150
M → F	104	104	108
F → M	156	150	150

*R: Rest Position
M: Middle Position
F: Fully Extended Position

Table 3-2
Worst Case Return Loss For TAR #2

Beam	Before Repairs	After Repairs
1	10.0 dB (6.950 GHz)	13.8 dB (7.400 GHz)
2	12.3 dB (6.925 GHz)	13.1 dB (7.075 GHz)
3	14.2 dB (6.950 GHz)	14.4 dB (6.750 GHz)
4	13.0 dB (6.725 GHz)	12.9 dB (6.750 GHz)
5	12.3 dB (7.250 GHz)	13.5 dB (7.400 GHz)

Table 3-3
Microwave Performance Specifications
XM - 08 TAR Antenna
(Vertical Polarization)

Beam	Beam Elevation (deg)	Beamwidths		Sidelobe Levels, Max.	
		Azimuth (deg)	Elevation (deg)	Azimuth (dB)	Elevation (dB)
1	2.7 ± 0.2	1.5 ± 0.2	3.8 ± 0.6	-13.5	-5.5
2	5.7 ± 0.7	1.6 ± 0.2	4.1 ± 0.6	-13.5	-8.5
3	11.9 ± 2.0	1.6 ± 0.4	9.3 ± 1.9	-8.5	-3.5
4	17.7 ± 1.7	1.9 ± 0.4	9.2 ± 1.6	-5.0	-4.0
5	22.1 ± 1.1	2.9 ± 0.6	11.0 ± 2.0	-7.0	-12.5

Table 3-4
Microwave Test Results For TAR #2
6.7 GHz

Beam	Beam Elevation (deg)	Beamwidths		Sidelobe Levels, Max.	
		Azimuth (deg)	Elevation (deg)	Azimuth (dB)	Elevation (dB)
1	2.7	1.50	4.10	15.8	7.0
2	6.4	1.50	4.00	13.8	11.6
3	11.5	1.45	6.40	12.6	12.8
4	17.1	1.95	9.60	12.0	15.2
5	22.4	3.25	12.00	10.4	20.0

Table 3-5
Microwave Test Results For TAR #2
7.0 GHz

Beam	Beam Elevation (deg)	Beamwidths		Sidelobe Levels, Max.	
		Azimuth (deg)	Elevation (deg)	Azimuth (dB)	Elevation (dB)
1	3.3	1.35	4.30	15.2	16.4
2	5.5	1.35	4.10	12.8	13.8
3	10.7	1.40	8.60	11.8	12.4
4	17.0	2.00	10.00	11.3	14.5
5	21.9	2.70	11.10	8.3	23.0

Table 3-6
Microwave Test Results For TAR #2
7.4 GHz

Beam	Beam Elevation (deg)	Beamwidths		Sidelobe Levels, Max.	
		Azimuth (deg)	Elevation (deg)	Azimuth (dB)	Elevation (dB)
1	2.6	1.30	3.60	13.5	9.4
2	6.2	1.40	3.70	13.7	12.4
3	12.0	1.60	8.00	12.2	12.9
4	16.2	1.90	10.20	10.0	14.5
5	22.1	2.70	10.50	15.4	20.0

Table 3-7
TAR #2 - Beam 2 Gain

Frequency (GHz)	Gain (dBi)
6.7	32.3
7.0	32.7
7.4	32.6

Table 3-8
TAR #2
Azimuth Beam Center Scan

Beam	6.7 GHz	7.0 GHz	7.4 GHz
1	-0.20°	-0.15°	-0.20°
2	-0.10°	-0.10°	-0.10°
3	0.00°	0.00°	0.00°
4	0.15°	0.15°	0.20°
5	0.20°	0.25°	0.30°

APPENDIX

BEAM1 TAR#2 7MAY84

FREQUENCY GHz	RETURN LOSS dB	Deg
7.00	11.9	115.
7.05	12.6	57.
7.10	14.4	-38.
7.15	14.1	-154.
7.20	11.6	116.
7.25	12.0	34.
7.30	16.1	-56.
7.35	13.2	-149.
7.40	14.1	94.
7.45	19.7	-18.
7.50	10.0	-81.
7.55	11.5	-149.
7.60	14.5	109.
7.65	20.2	19.
7.70	13.9	-116.
7.75	12.0	176.
7.80	14.7	97.
7.85	15.2	-37.
7.90	12.1	-132.
7.95	13.4	158.
8.00	17.8	86.
8.05	20.3	-116.
8.10	16.5	-148.
8.15	13.6	142.
8.20	11.5	58.
8.25	11.3	-176.
8.30	15.0	-108.
8.35	15.6	94.
8.40	20.2	43.

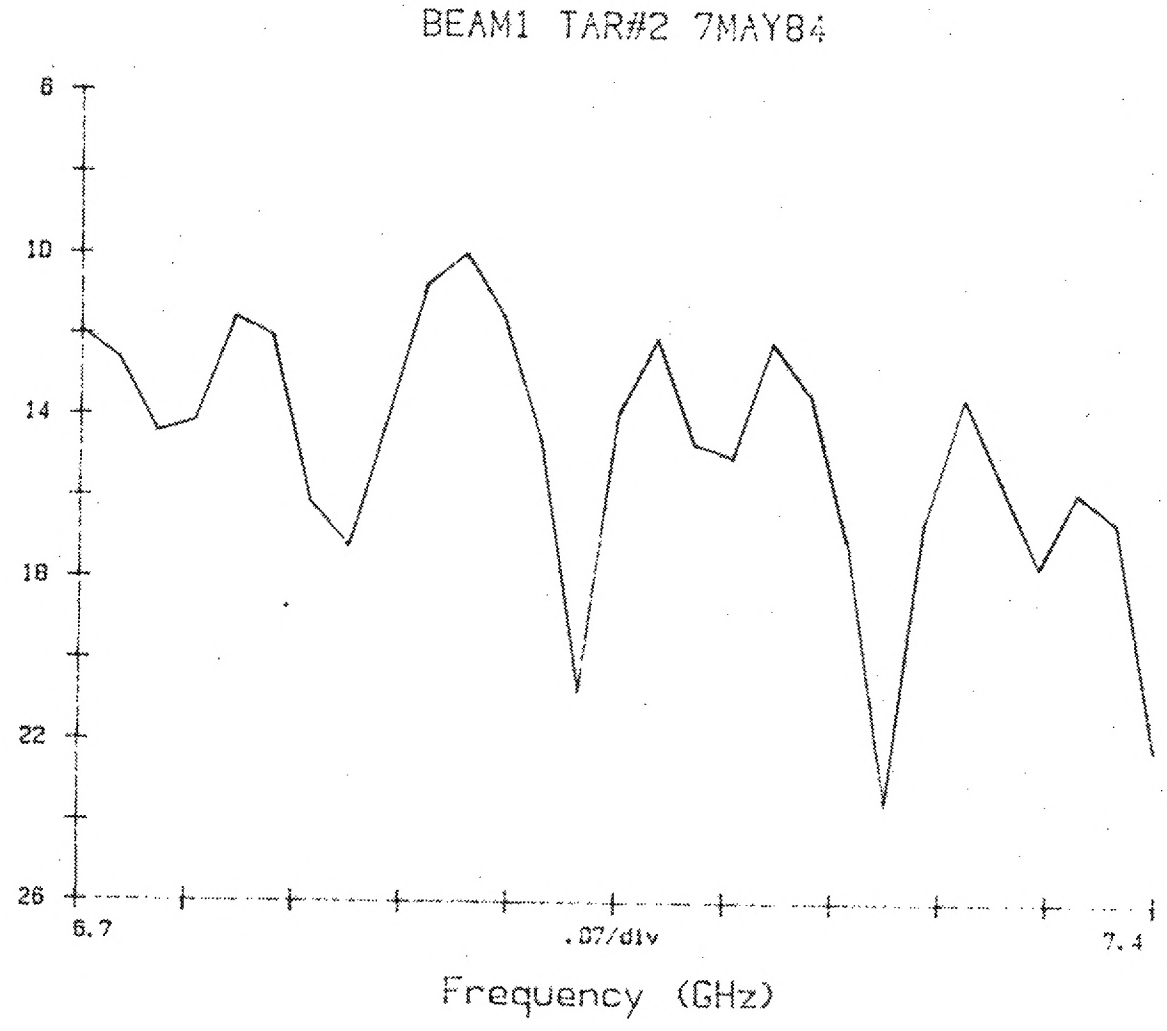


Figure B-1. TAR #2 Return Loss - Beam 1, Before Refurbishment.

BEAM2 TAR#2 7MAY84

FREQUENCY GHz	RETURN LOSS dB	Deg
6.700	18.2	107.
6.725	22.6	88.
6.750	31.4	-14.
6.775	20.5	-145.
6.800	16.2	130.
6.825	15.1	69.
6.850	18.5	-29.
6.875	20.0	-159.
6.900	15.3	88.
6.925	12.3	-28.
6.950	14.1	-97.
6.975	20.7	-118.
7.000	19.0	-124.
7.025	19.8	-153.
7.050	17.6	-161.
7.075	15.8	160.
7.100	21.1	79.
7.125	18.6	-72.
7.150	13.3	-146.
7.175	14.5	139.
7.200	24.3	-177.
7.225	13.3	116.
7.250	18.3	31.
7.275	23.1	-84.
7.300	24.9	-120.
7.325	17.9	-140.
7.350	13.8	142.
7.375	13.5	75.
7.400	14.7	14.

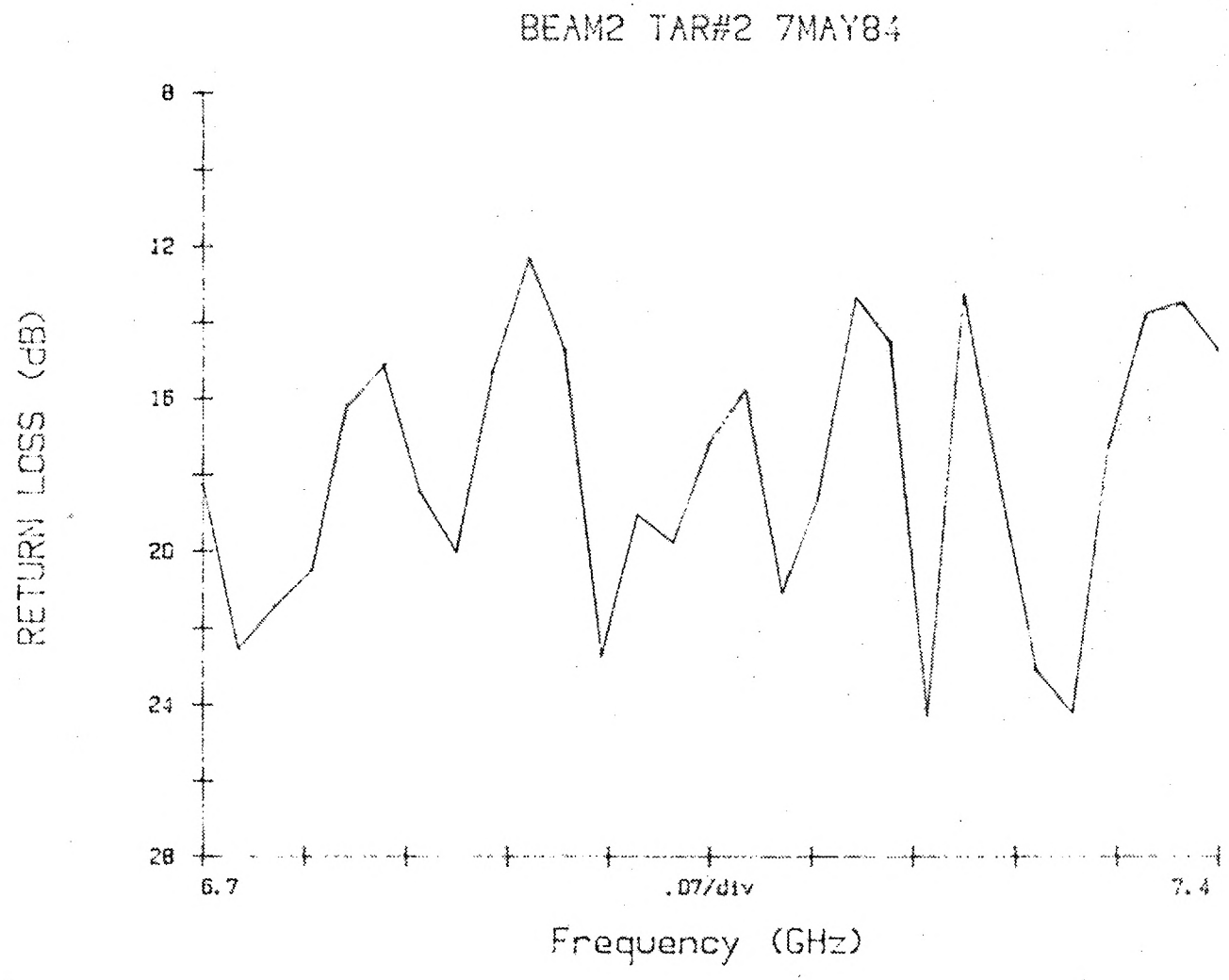


Figure B-2. TAR #2 Return Loss - Beam 2, Before Refurbishment.

BEAM 3 TAR# 2 7MAY84

FREQUENCY GHz	RETURN LOSS dB	Deg
6.700	17.9	11.
6.725	17.4	153.
6.750	14.6	64.
6.775	18.1	4.
6.800	37.9	-34.
6.825	35.8	-36.
6.850	26.4	-179.
6.875	20.7	73.
6.900	20.0	11.
6.925	15.9	-39.
6.950	14.0	-101.
6.975	19.7	174.
7.000	39.7	-96.
7.025	19.3	-123.
7.050	17.5	-167.
7.075	19.3	-161.
7.100	15.8	-180.
7.125	13.7	143.
7.150	20.6	116.
7.175	35.0	30.
7.200	22.6	-135.
7.225	28.4	136.
7.250	17.8	-156.
7.275	15.2	151.
7.300	17.3	95.
7.325	20.3	36.
7.350	21.4	-25.
7.375	20.7	-104.
7.400	19.4	152.

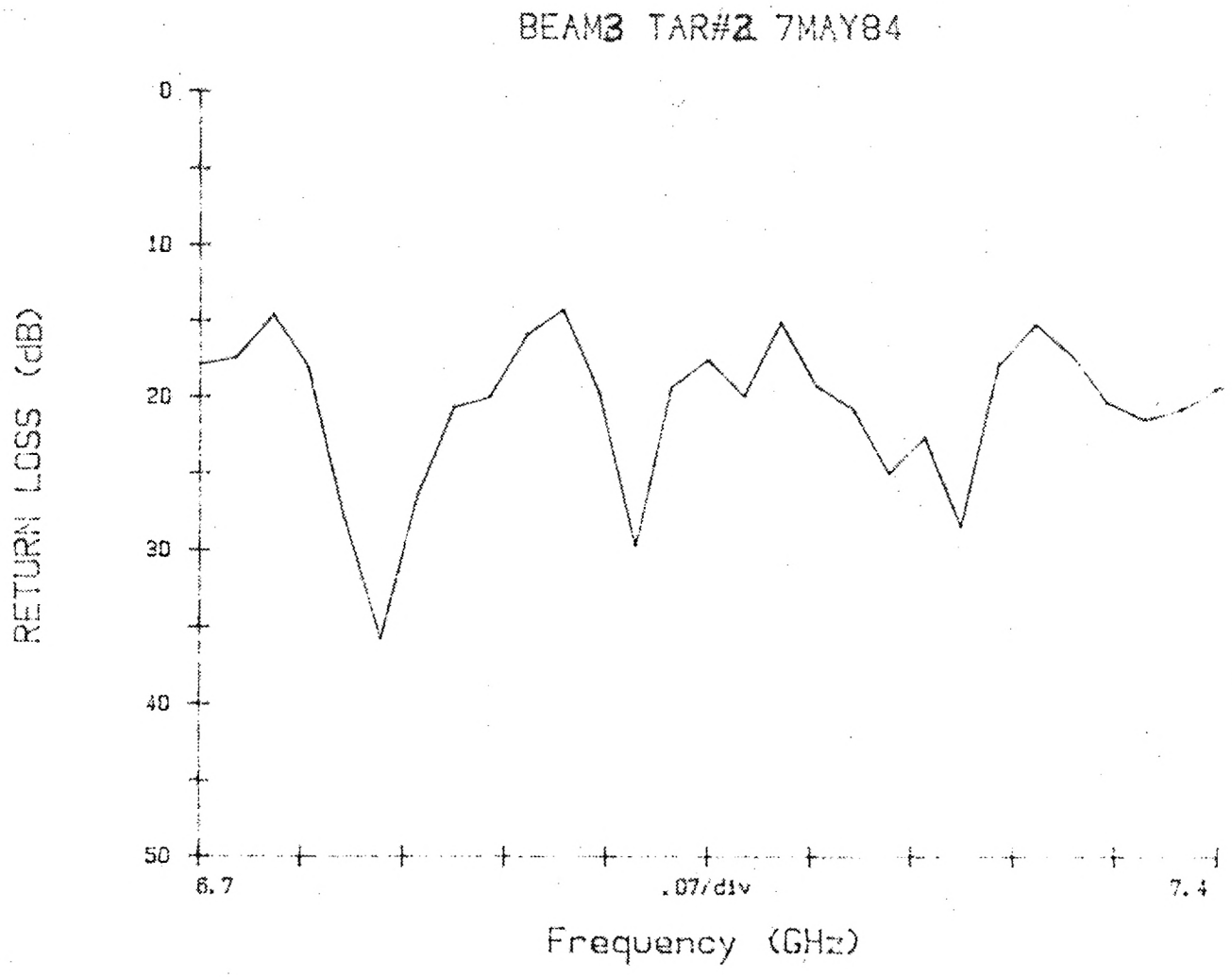
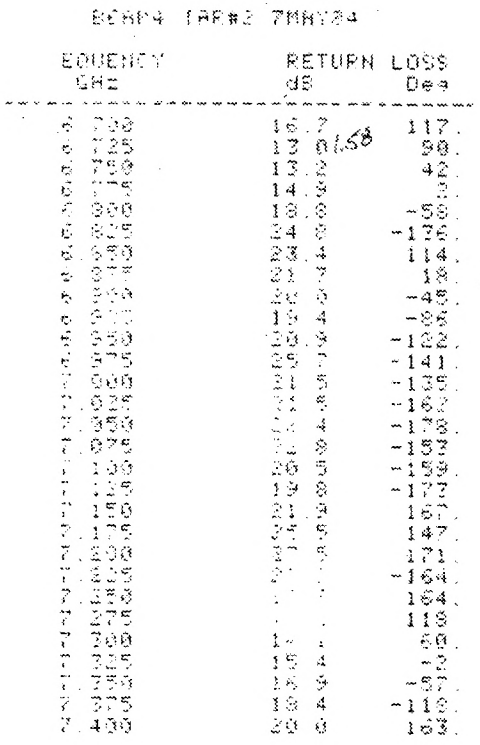


Figure B-3. TAR #2 Return Loss - Beam 3, Before Refurbishment.



BEAM4 TAR#2 7MAY84

EQUENCY GHz	RETURN LOSS dB	Deg
6.700	16.7	117.
6.735	13.2	98.
6.800	12.3	46.
6.865	14.1	
6.900	10.8	-56.
6.935	9.4	-136.
7.000	9.4	-114.
7.035	9.8	18.
7.100	11.2	-48.
7.135	11.4	-102.
7.200	14.1	141.
7.235	16.5	135.
7.300	15.8	178.
7.335	15.5	159.
7.400	17.2	172.
7.435	16.2	167.
7.500	14.7	171.
7.535	16.4	-164.
7.600	11.8	164.
7.635	11.2	118.
7.700	11.1	66.
7.735	11.4	70.
7.800	9.9	-57.
7.835	10.3	-110.
7.900	10.3	163.

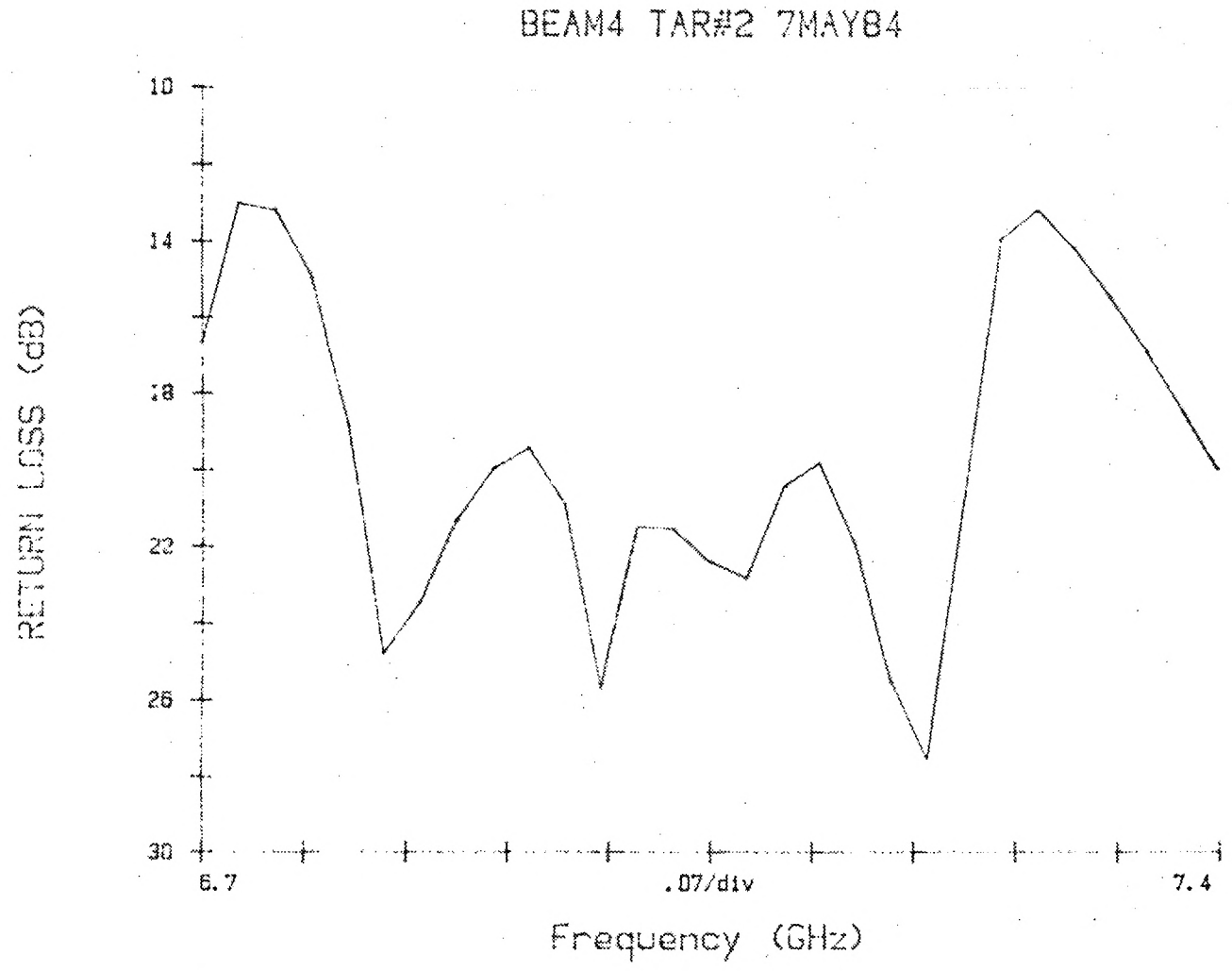


Figure B-4. TAR #2 Return Loss - Beam 4, Before Refurbishment.

BEAM5 TAR#2 7MAY84

FREQUENCY GHz	RETURN LOSS dB	Deg
6.700	16.6	117.
6.725	13.8	80.
6.750	14.7	26.
6.775	19.1	-28.
6.800	27.2	-122.
6.825	25.0	121.
6.850	22.6	50.
6.875	23.8	6.
6.900	23.0	-32.
6.925	20.8	-57.
6.950	19.9	-69.
6.975	17.6	-102.
7.000	16.6	-145.
7.025	17.8	173.
7.050	26.1	135.
7.075	21.1	-107.
7.100	14.8	-143.
7.125	13.0	173.
7.150	13.6	120.
7.175	16.5	54.
7.200	19.7	-35.
7.225	15.8	-131.
7.250	12.3	169.
7.275	12.8	113.
7.300	14.0	42.
7.325	14.6	-39.
7.350	14.5	-116.
7.375	13.8	166.
7.400	13.2	96.

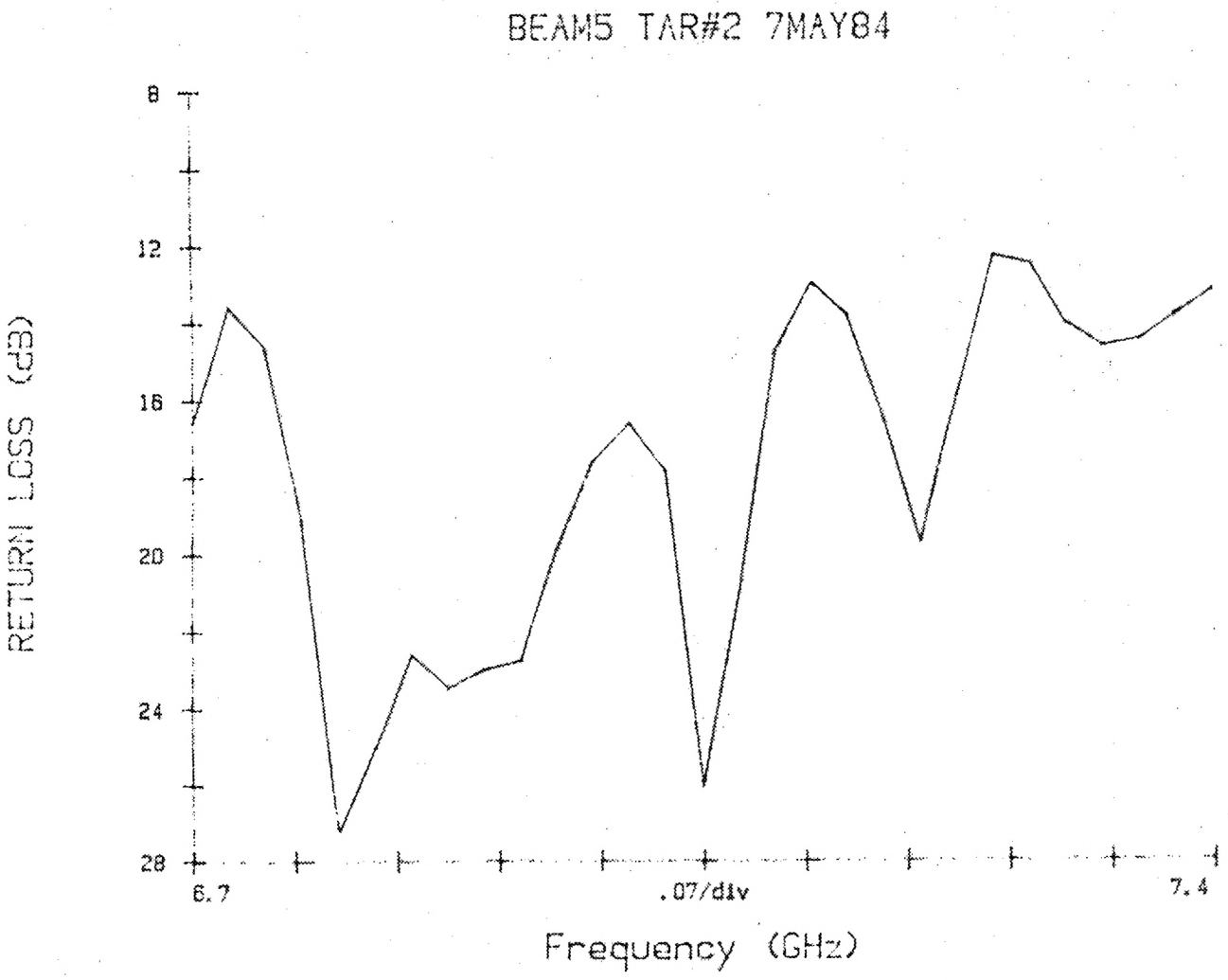


Figure B-5. TAR #2 Return Loss - Beam 5, Before Refurbishment.

TAR2 B1 RADPAINTD PIN MOVED

FREQUENCY GHz	RETURN LOSS dB	Deg
6.700	19.0	-149.
6.725	21.5	50.
6.750	20.6	-133.
6.775	20.2	133.
6.800	20.1	89.
6.825	20.3	86.
6.850	20.6	97.
6.875	15.7	-109.
6.900	16.1	100.
6.925	21.4	73.
6.950	21.0	82.
6.975	20.9	-167.
7.000	21.5	53.
7.025	20.1	-172.
7.050	16.8	165.
7.075	16.1	71.
7.100	18.4	-6.
7.125	20.7	177.
7.150	18.2	-14.
7.175	21.5	-152.
7.200	21.1	-7.
7.225	18.2	-150.
7.250	17.4	85.
7.275	16.3	-110.
7.300	14.4	-123.
7.325	14.5	104.
7.350	16.7	-138.
7.375	16.1	174.
7.400	13.8	54.

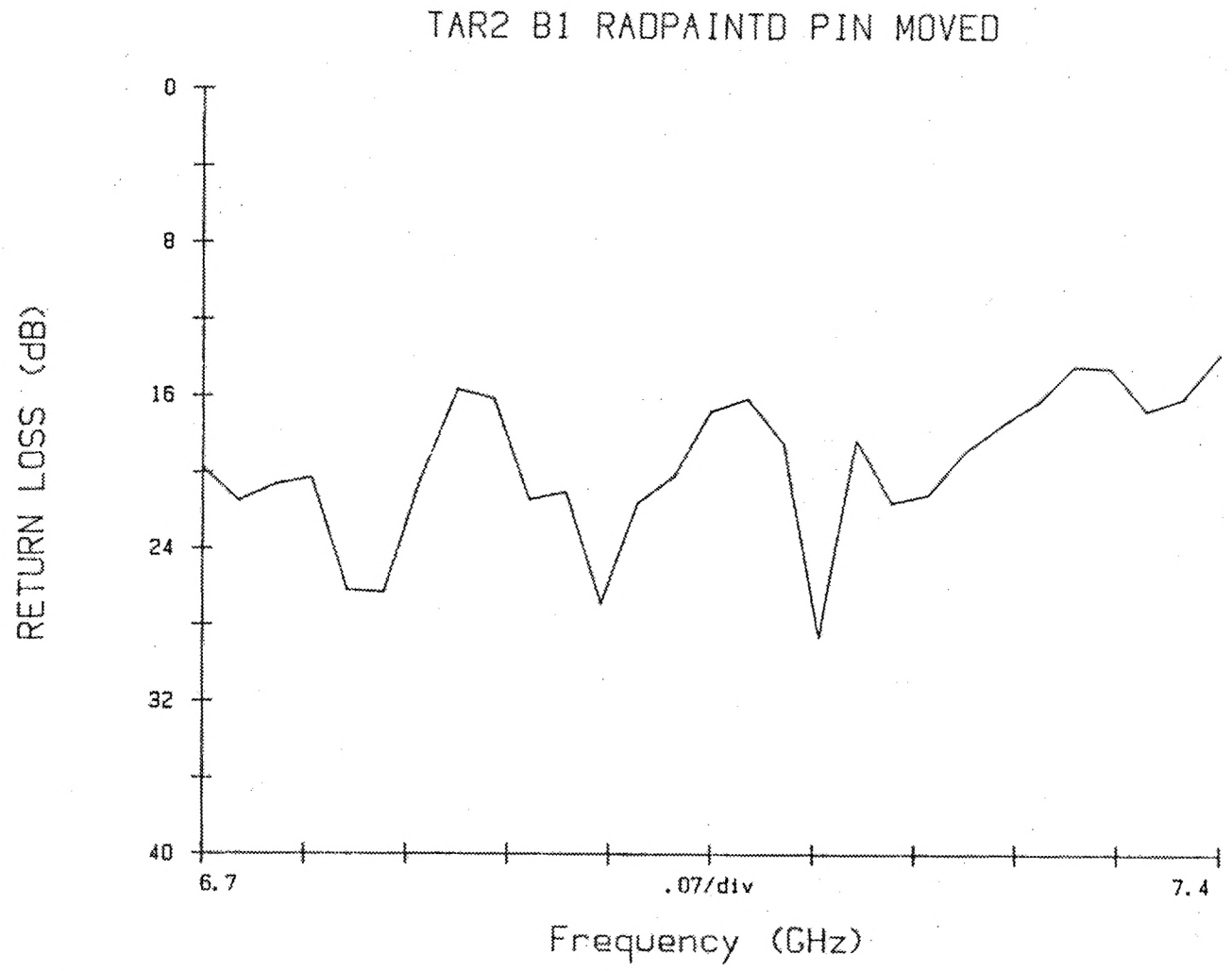


Figure B-6. TAR #2 Return Loss - Beam 1, After Refurbishment.

TAR2 B2 RADPAINTD PIN MOVED

FREQUENCY GHz	RETURN LOSS dB	Deg
6.700	44.9	40.
6.725	26.7	-142.
6.750	20.9	139.
6.775	24.9	-59.
6.800	15.7	154.
6.825	13.7	49.
6.850	15.1	-85.
6.875	19.9	136.
6.900	37.7	-73.
6.925	17.4	121.
6.950	17.6	11.
6.975	28.4	-152.
7.000	23.0	46.
7.025	20.3	-71.
7.050	15.3	170.
7.075	13.1	65.
7.100	17.5	-38.
7.125	24.9	146.
7.150	18.8	2.
7.175	23.7	-126.
7.200	30.0	-52.
7.225	19.5	118.
7.250	19.2	-12.
7.275	25.3	-109.
7.300	27.6	116.
7.325	22.4	12.
7.350	18.8	-107.
7.375	15.4	137.
7.400	14.1	33.

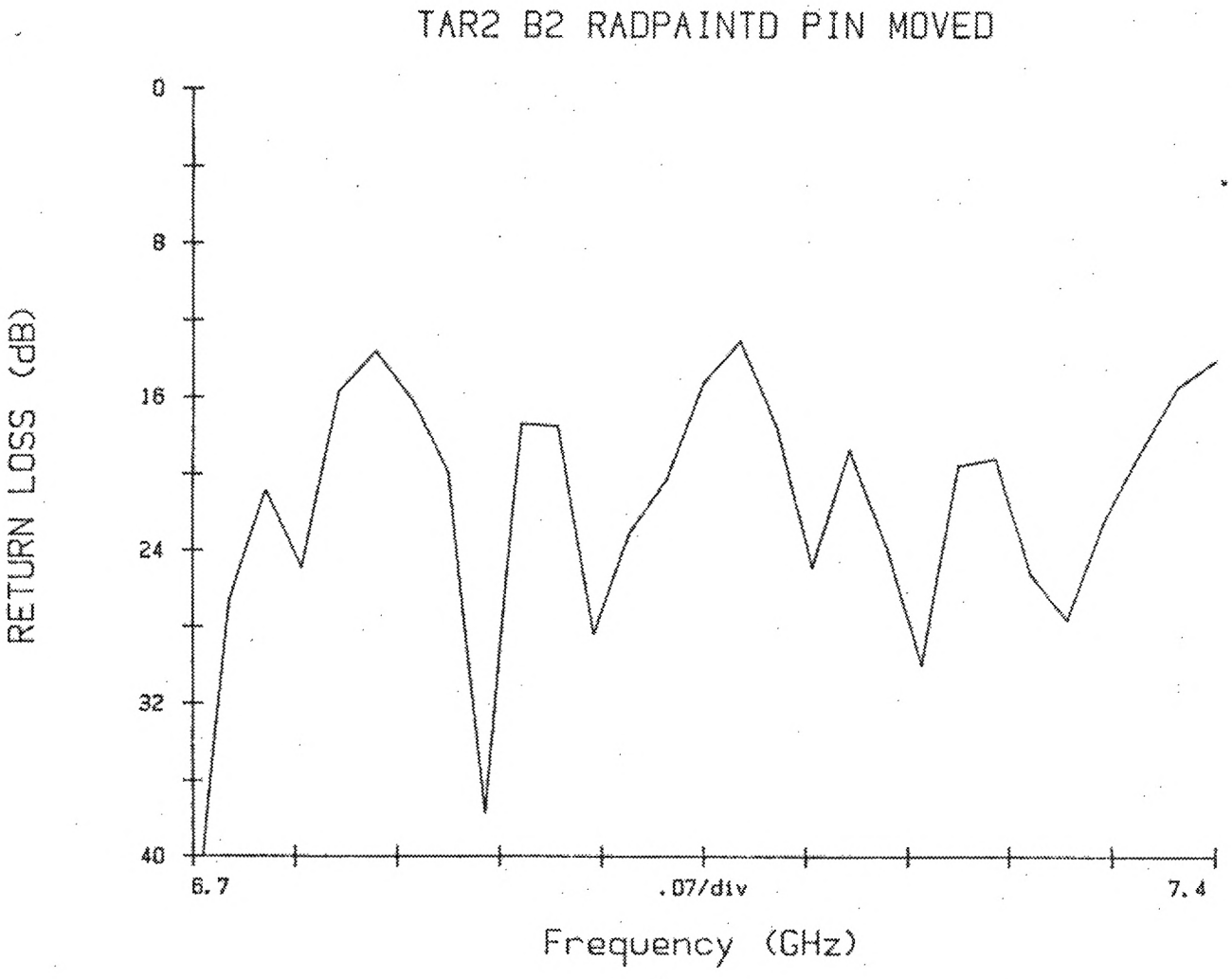
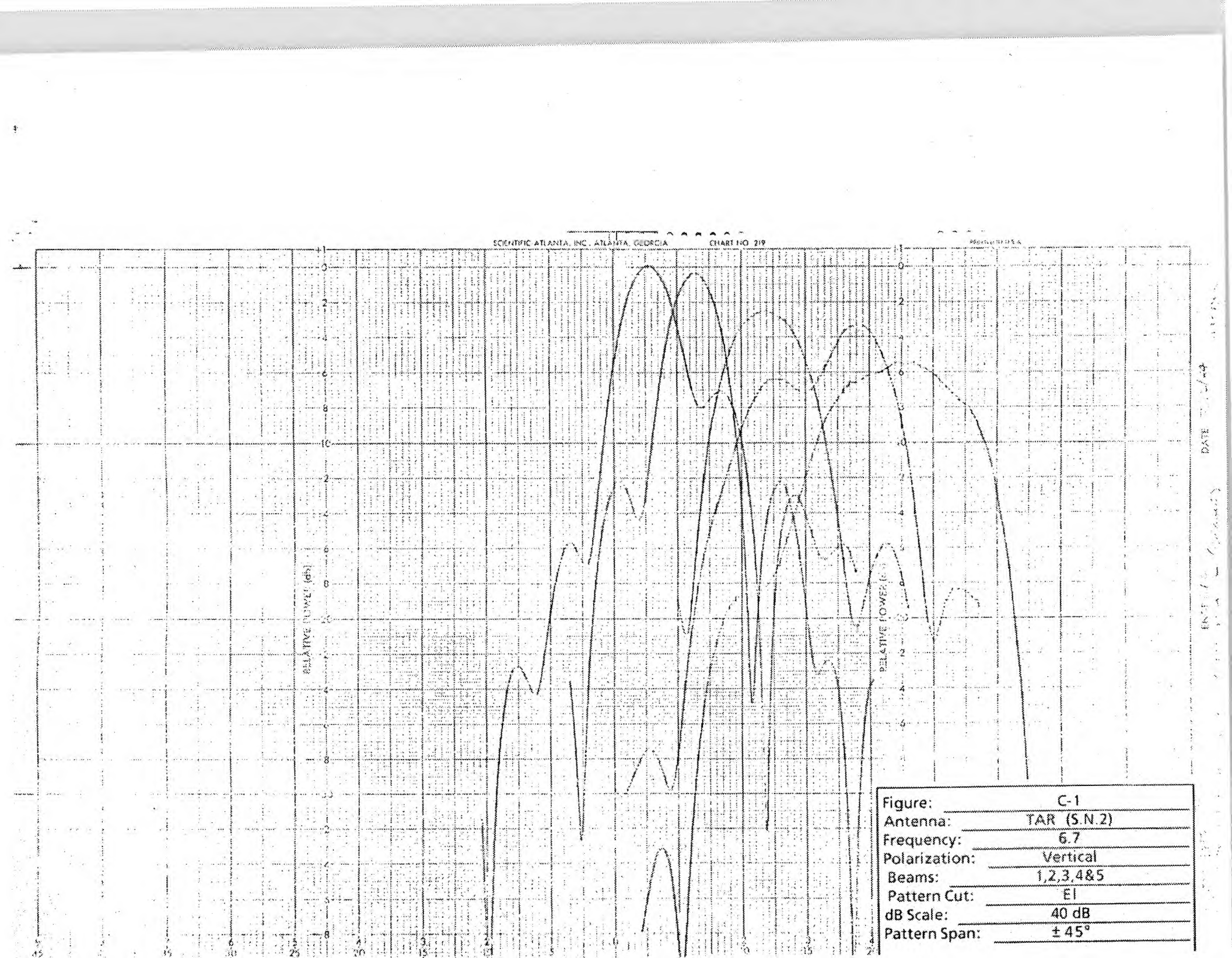


Figure B-7. TAR #2 Return Loss - Beam 2, After Refurbishment.


SCIENTIFIC ATLANTA, INC., ATLANTA, GEORGIA
CHART NO. 219
RELATIVE POWER (dB)
RELATIVE POWER (dB)
Figure: C-1
Antenna: TAR (S.N.2)
Frequency: 6.7
Polarization: Vertical
Beams: 1,2,3,4&5
Pattern Cut: El
dB Scale: 40 dB
Pattern Span: ± 45°

TAR2 B3 RADPAINTD PIN MOVED

FREQUENCY GHz	RETURN LOSS dB	Deg
6.700	16.1	-140.
6.725	21.7	1.
6.750	14.4	-167.
6.775	15.4	96.
6.800	24.1	3.
6.825	31.5	125.
6.850	32.1	124.
6.875	27.2	1.
6.900	21.6	-152.
6.925	15.9	117.
6.950	16.0	28.
6.975	27.8	-75.
7.000	27.7	-21.
7.025	22.5	-138.
7.050	19.3	106.
7.075	22.4	90.
7.100	16.3	34.
7.125	19.8	-56.
7.150	26.3	-141.
7.175	22.4	86.
7.200	19.9	-38.
7.225	29.2	-157.
7.250	21.3	132.
7.275	17.3	19.
7.300	19.3	-81.
7.325	19.5	-167.
7.350	19.7	102.
7.375	23.8	8.
7.400	35.7	147.

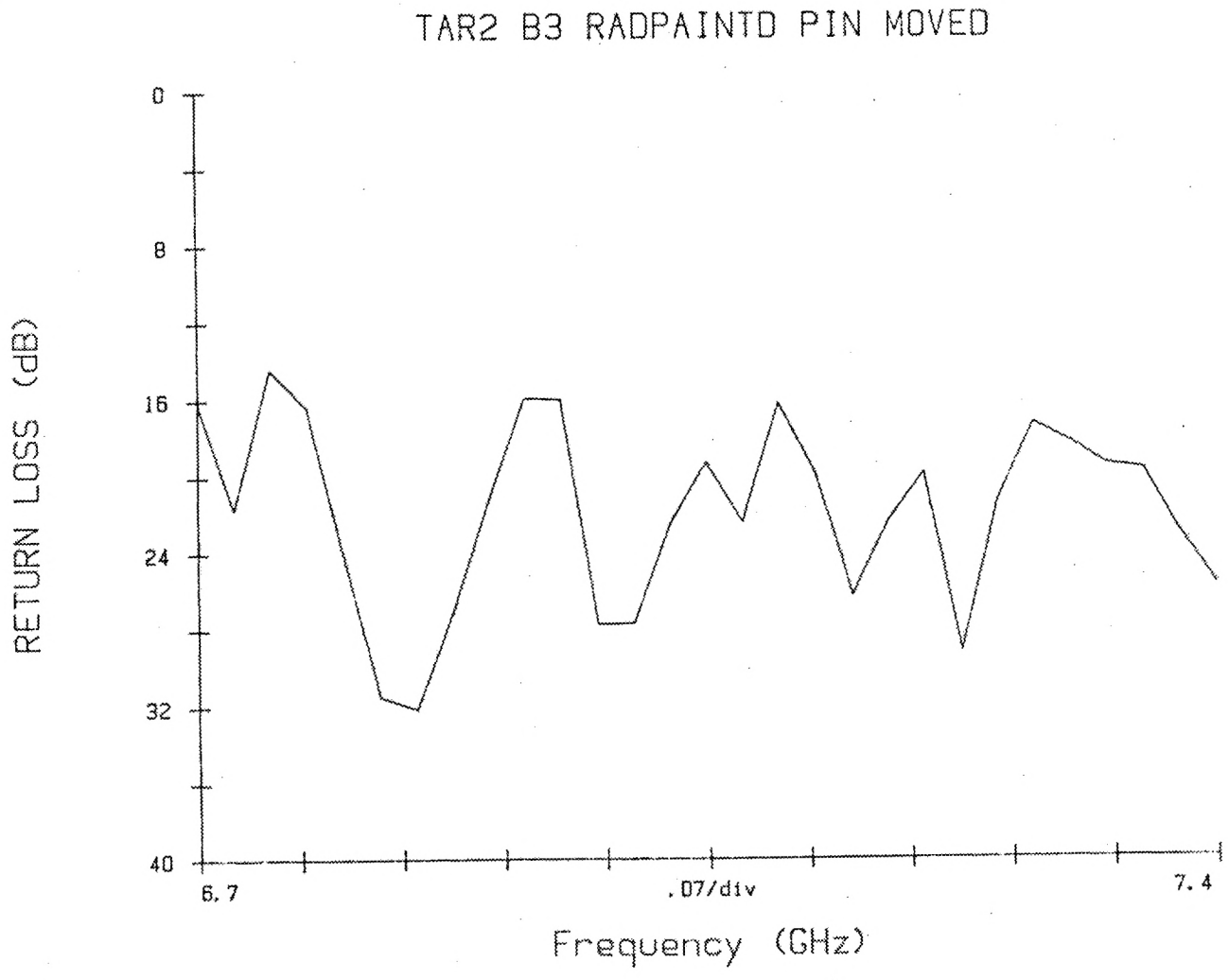


Figure B-8. TAR #2 Return Loss - Beam 3, After Refurbishment.

TAR2 B4 RADPAINTD PIN MOVED

FREQUENCY GHz	RETURN LOSS dB	Deg
6.700	22.3	-4
6.725	15.0	-93
6.750	12.9	173
6.775	14.7	89
6.800	19.3	-7
6.825	25.6	-151
6.850	23.4	88
6.875	25.0	-68
6.900	19.2	164
6.925	18.2	66
6.950	20.7	18
6.975	20.5	-33
7.000	28.7	-110
7.025	28.0	156
7.050	28.6	117
7.075	23.7	98
7.100	20.1	92
7.125	20.9	-19
7.150	29.3	-79
7.175	40.2	56
7.200	26.7	-47
7.225	21.6	-167
7.250	16.1	84
7.275	14.0	-16
7.300	14.6	-114
7.325	15.7	152
7.350	17.5	61
7.375	23.8	-24
7.400	39.4	151

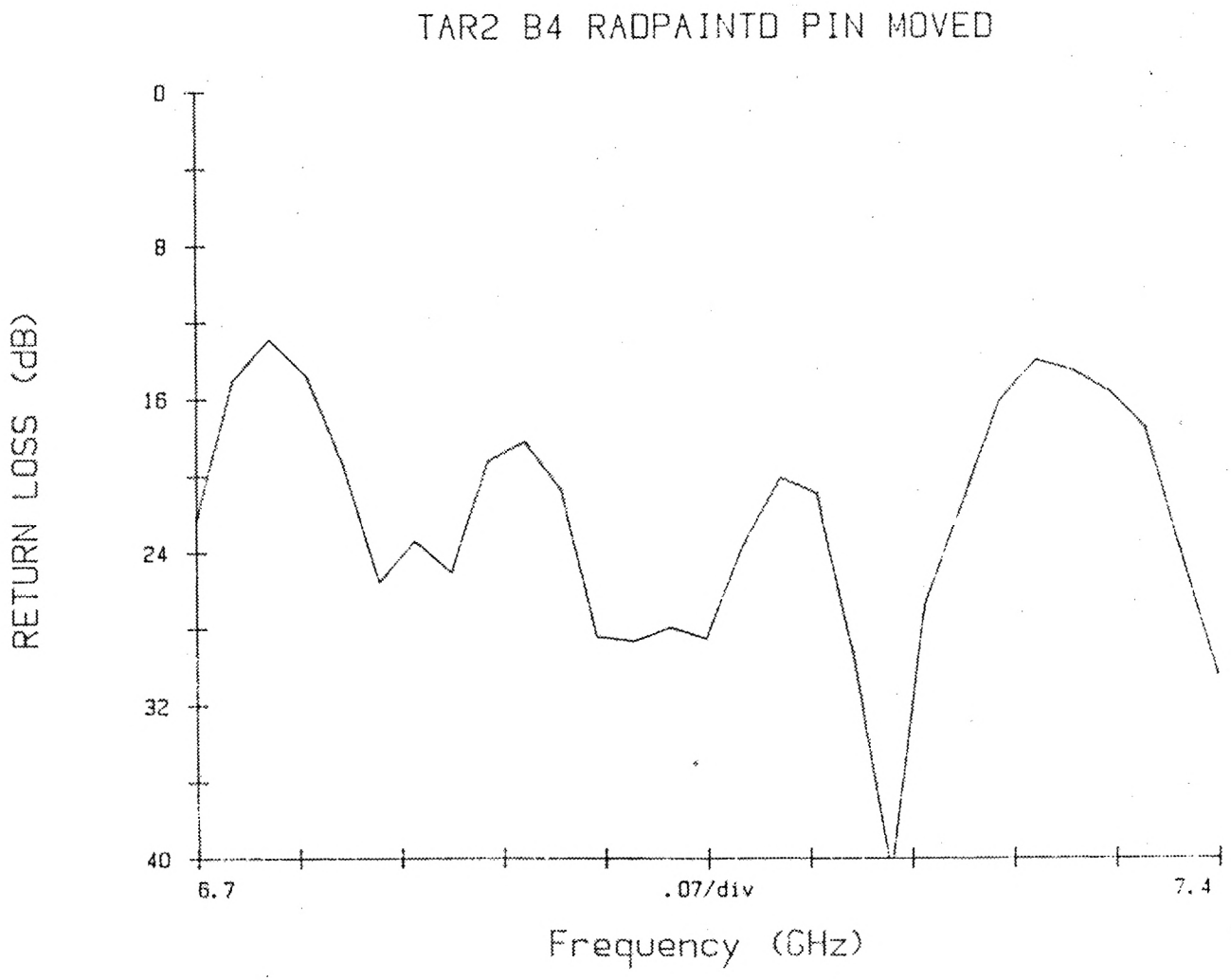


Figure B-9. TAR #2 Return Loss - Beam 4, After Refurbishment.

TAR2 B5 RADPAINTD PIN MOVED

FREQUENCY GHz	RETURN LOSS dB	Deg
6.700	21.5	-20.
6.725	15.9	-113.
6.750	13.1	156.
6.775	14.2	70.
6.800	14.9	-29.
6.825	16.6	112.
6.850	19.5	41.
6.875	23.4	-82.
6.900	24.4	-177.
6.925	18.3	116.
6.950	17.0	-68.
6.975	16.7	74.
7.000	21.4	-158.
7.025	22.6	125.
7.050	24.2	11.
7.075	20.4	141.
7.100	14.4	-98.
7.125	13.6	-34.
7.150	16.0	-144.
7.175	15.5	-23.
7.200	16.1	-164.
7.225	14.4	-58.
7.250	13.7	64.
7.275	14.2	-178.
7.300	15.7	110.
7.325	17.3	-112.
7.350	17.9	-155.
7.375	17.5	86.
7.400	16.5	6.

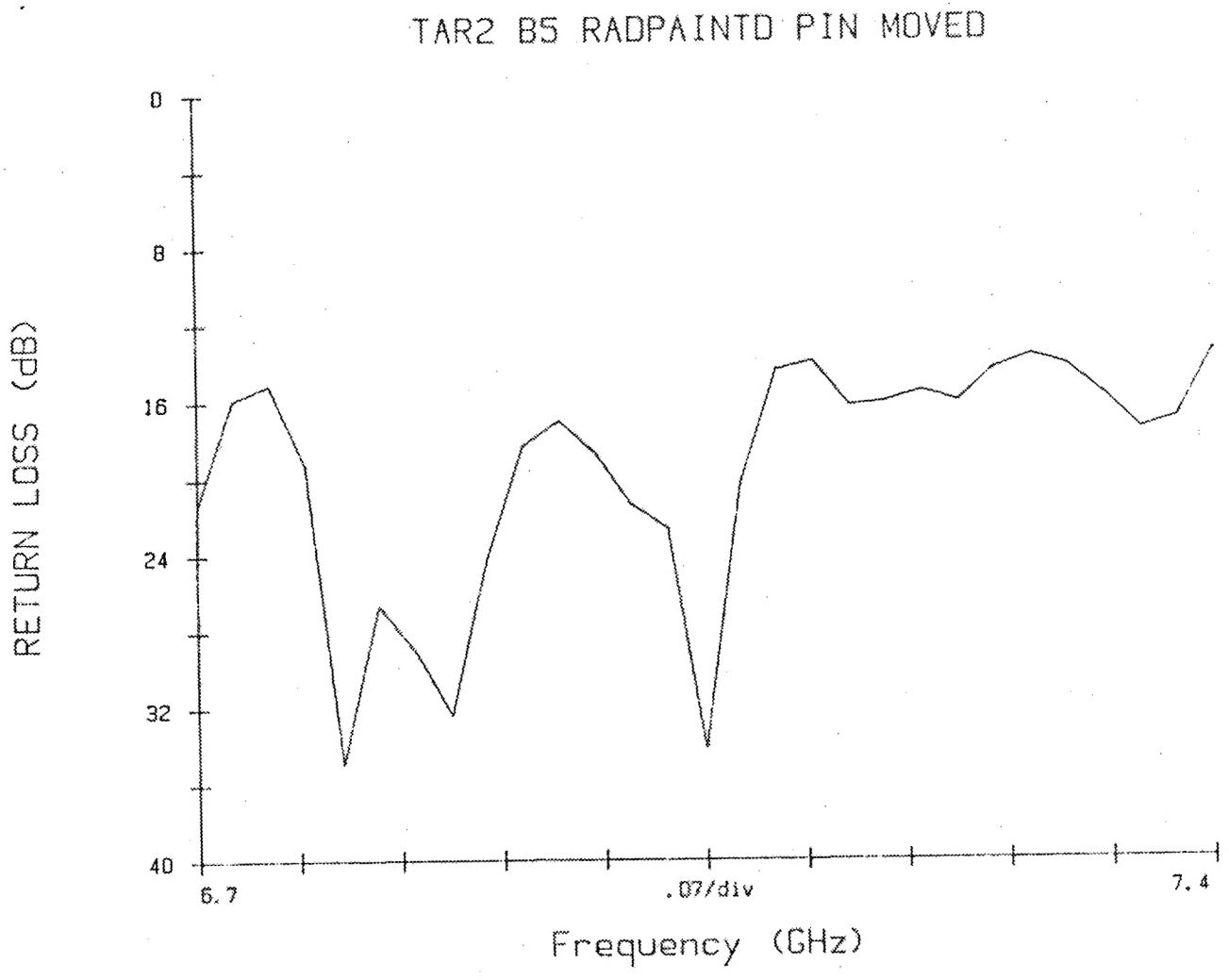


Figure B-10. TAR #2 Return Loss - Beam 5, After Refurbishment.

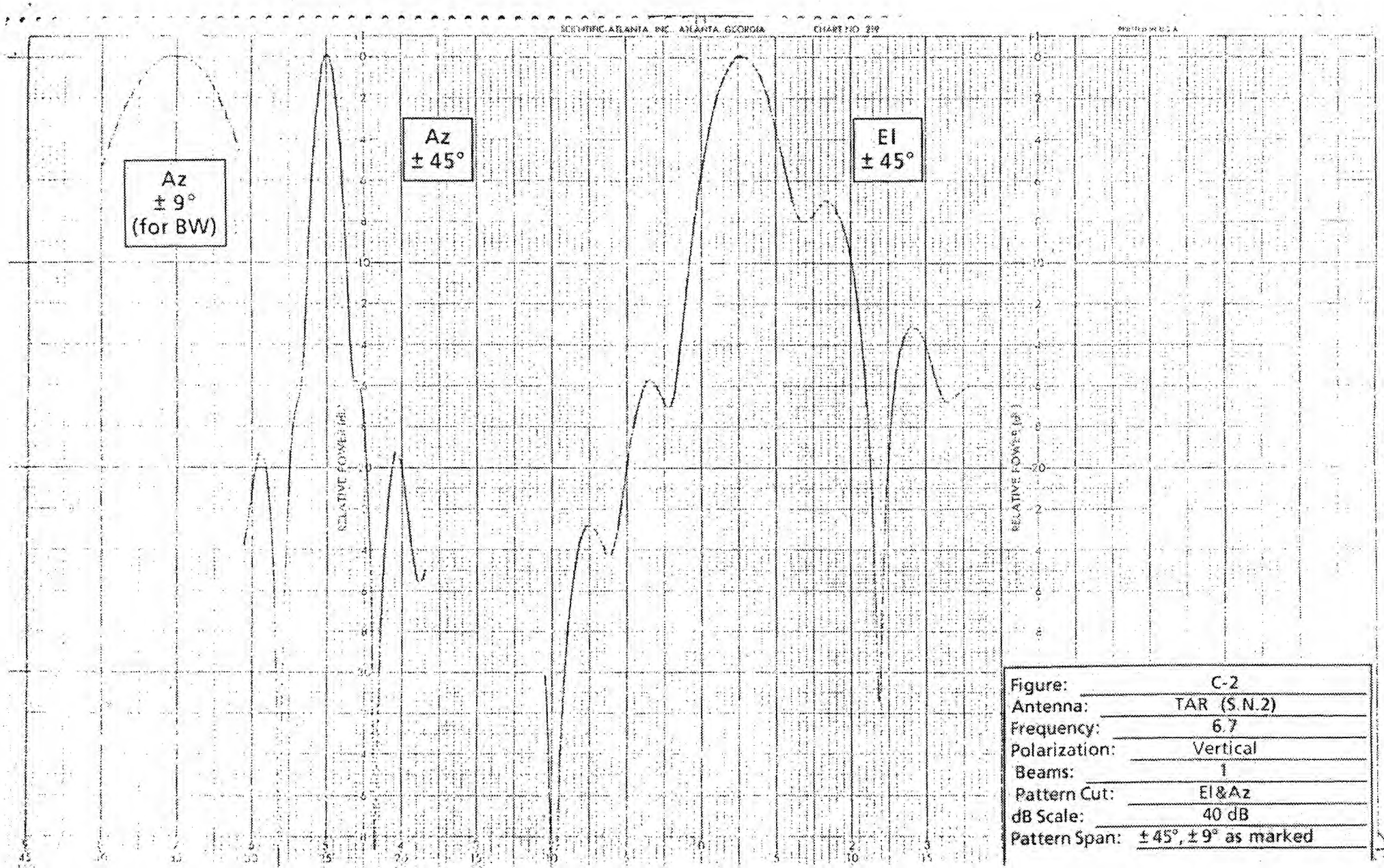


Figure:	C-2
Antenna:	TAR (S.N.2)
Frequency:	6.7
Polarization:	Vertical
Beams:	1
Pattern Cut:	El&Az
dB Scale:	40 dB
Pattern Span:	± 45°, ± 9° as marked

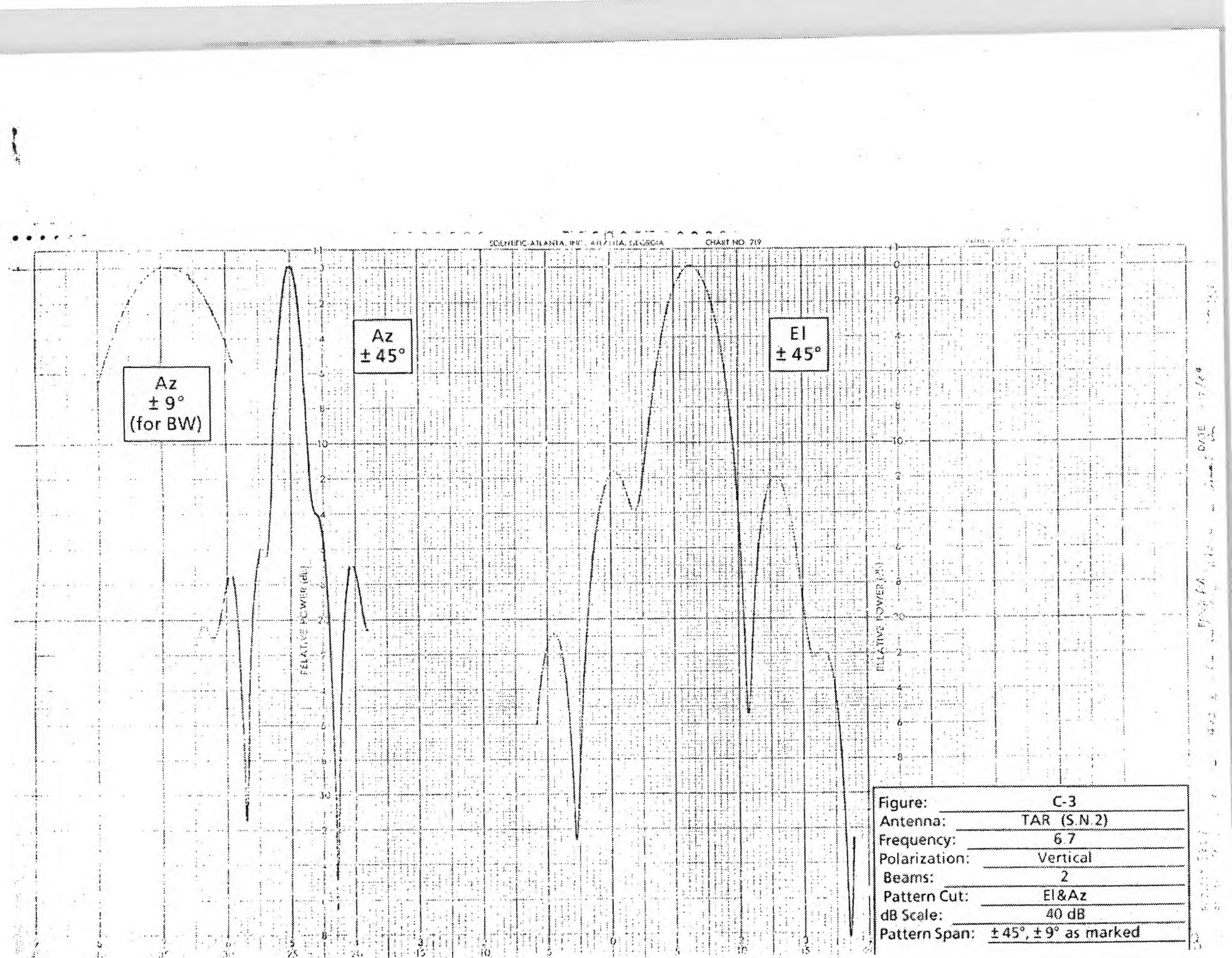


Figure:	C-3
Antenna:	TAR (S.N.2)
Frequency:	6.7
Polarization:	Vertical
Beams:	2
Pattern Cut:	El&Az
dB Scale:	40 dB
Pattern Span:	± 45°, ± 9° as marked

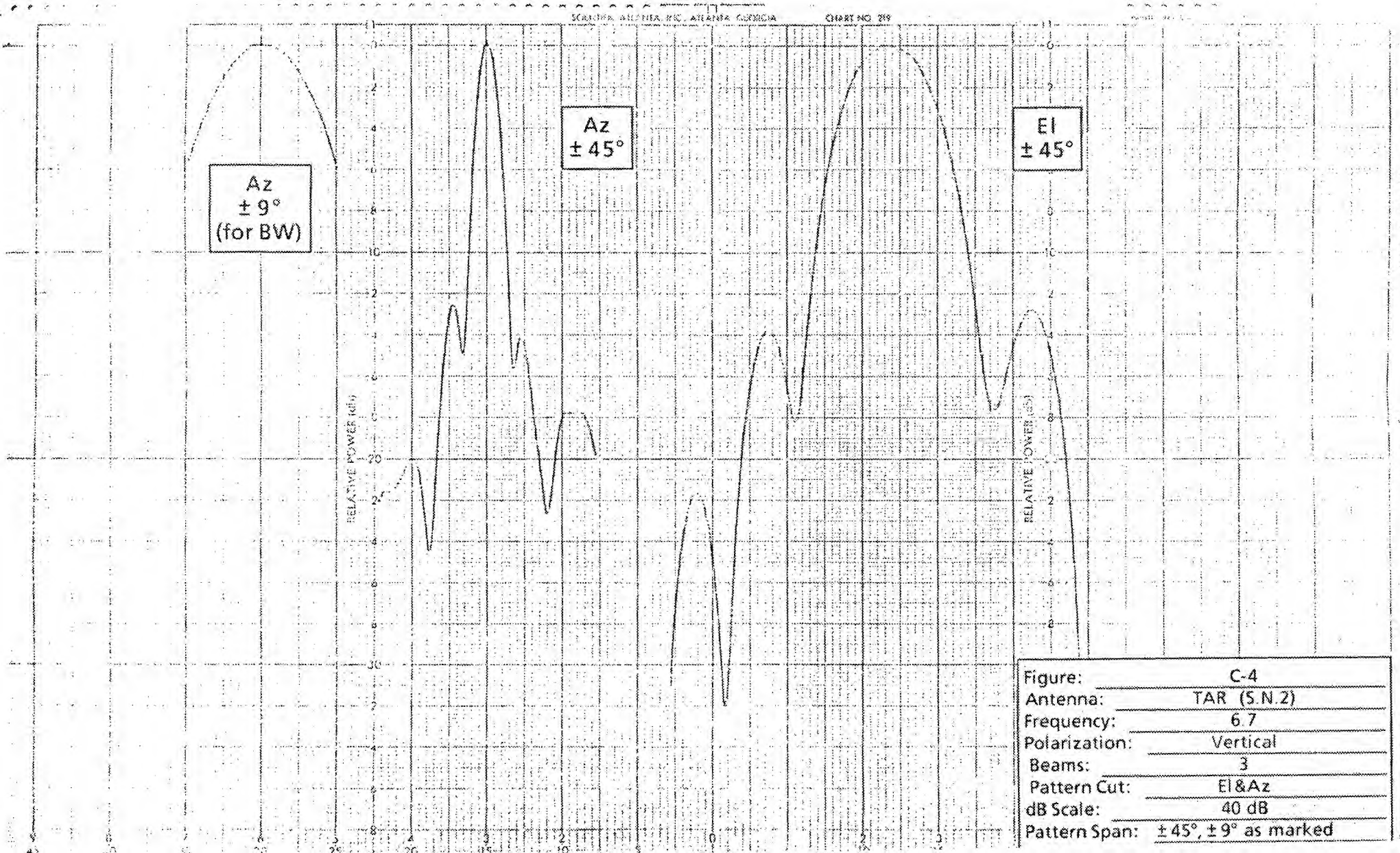


Figure:	C-4
Antenna:	TAR (S.N.2)
Frequency:	6.7
Polarization:	Vertical
Beams:	3
Pattern Cut:	El&Az
dB Scale:	40 dB
Pattern Span:	±45°, ±9° as marked

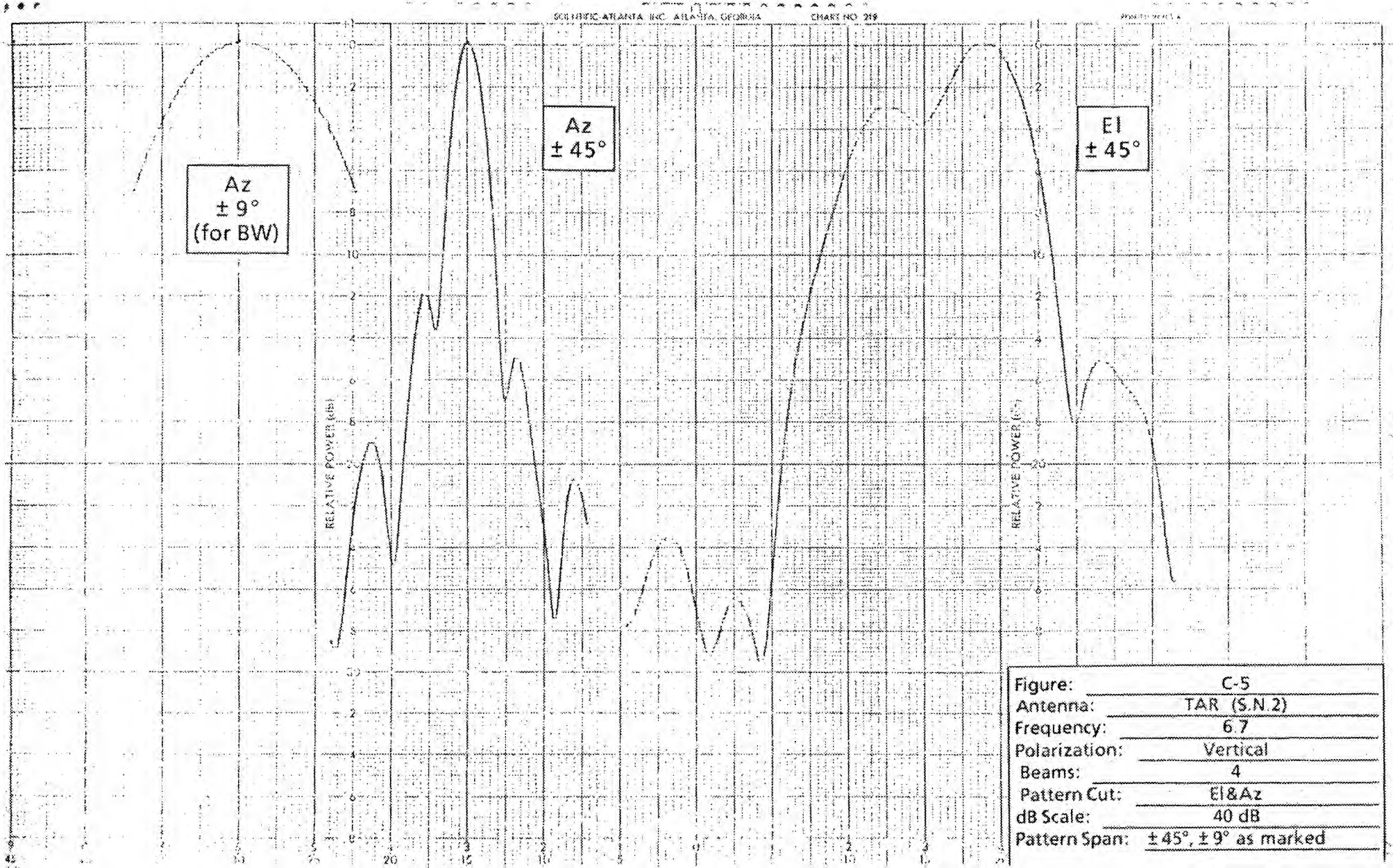


Figure:	C-5
Antenna:	TAR (S.N.2)
Frequency:	6.7
Polarization:	Vertical
Beams:	4
Pattern Cut:	El&Az
dB Scale:	40 dB
Pattern Span:	±45°, ±9° as marked

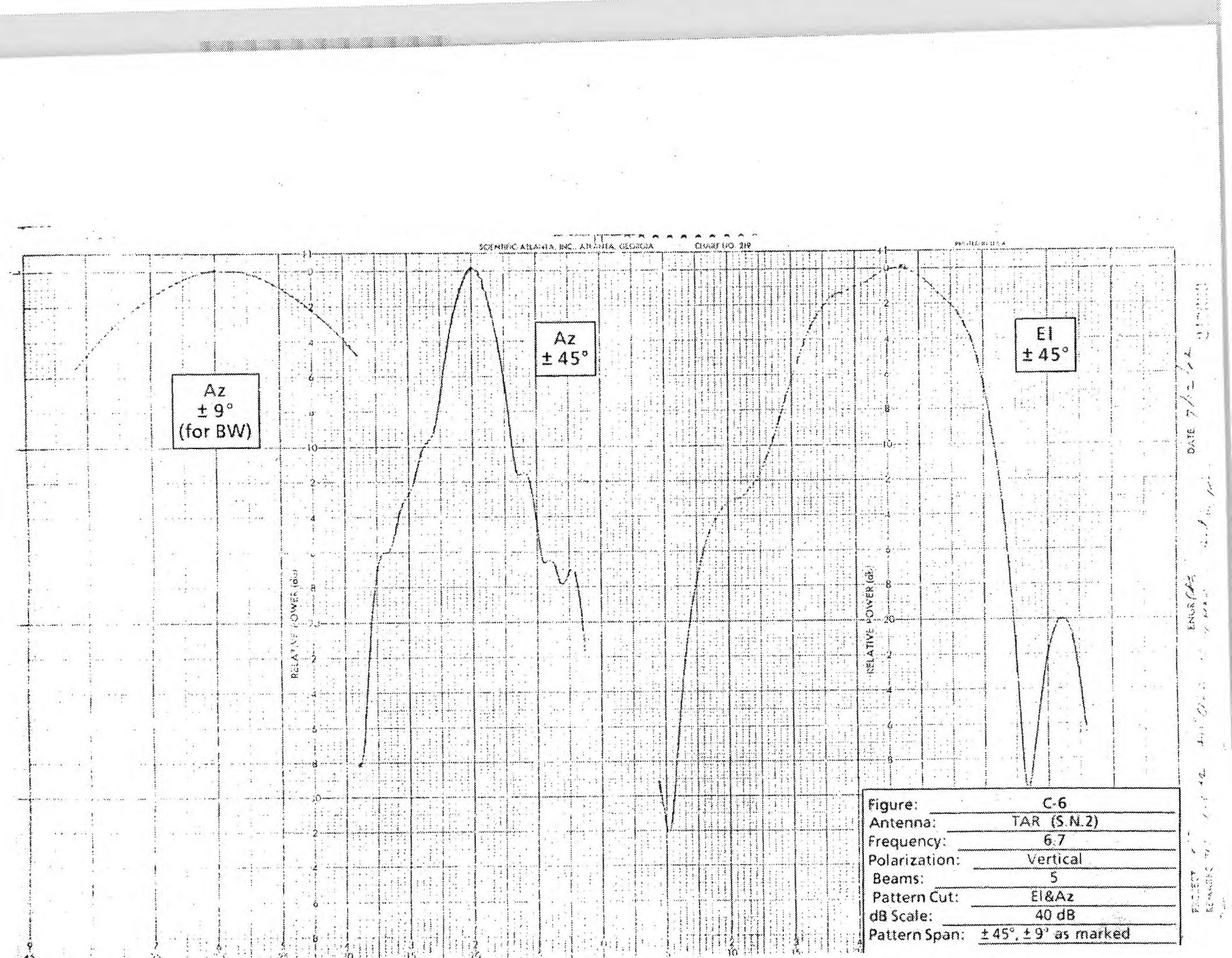


Figure:	C-6
Antenna:	TAR (S.N.2)
Frequency:	6.7
Polarization:	Vertical
Beams:	5
Pattern Cut:	El&Az
dB Scale:	40 dB
Pattern Span:	± 45°, ± 9° as marked

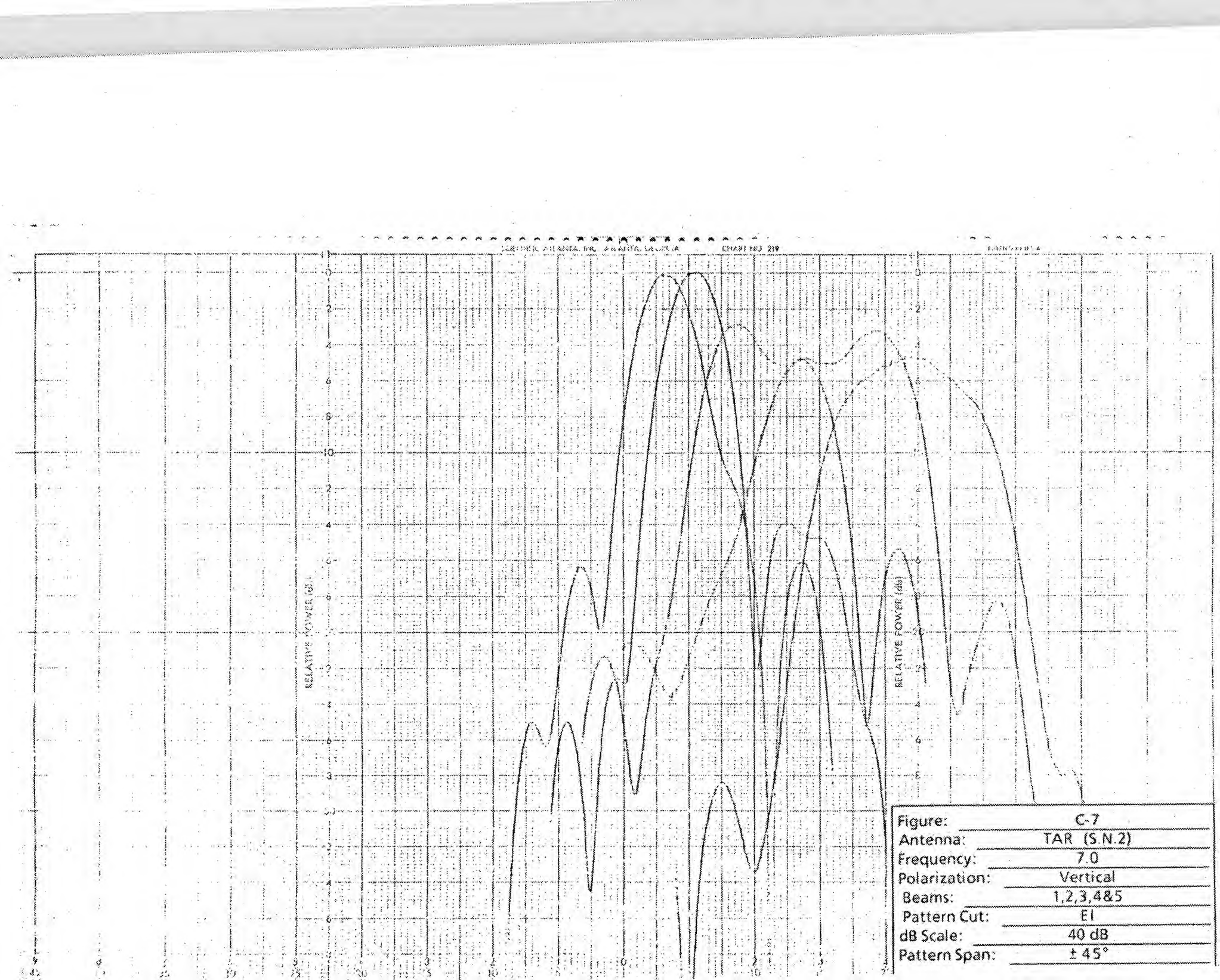


Figure:	C-7
Antenna:	TAR (S.N.2)
Frequency:	7.0
Polarization:	Vertical
Beams:	1,2,3,4&5
Pattern Cut:	EI
dB Scale:	40 dB
Pattern Span:	± 45°

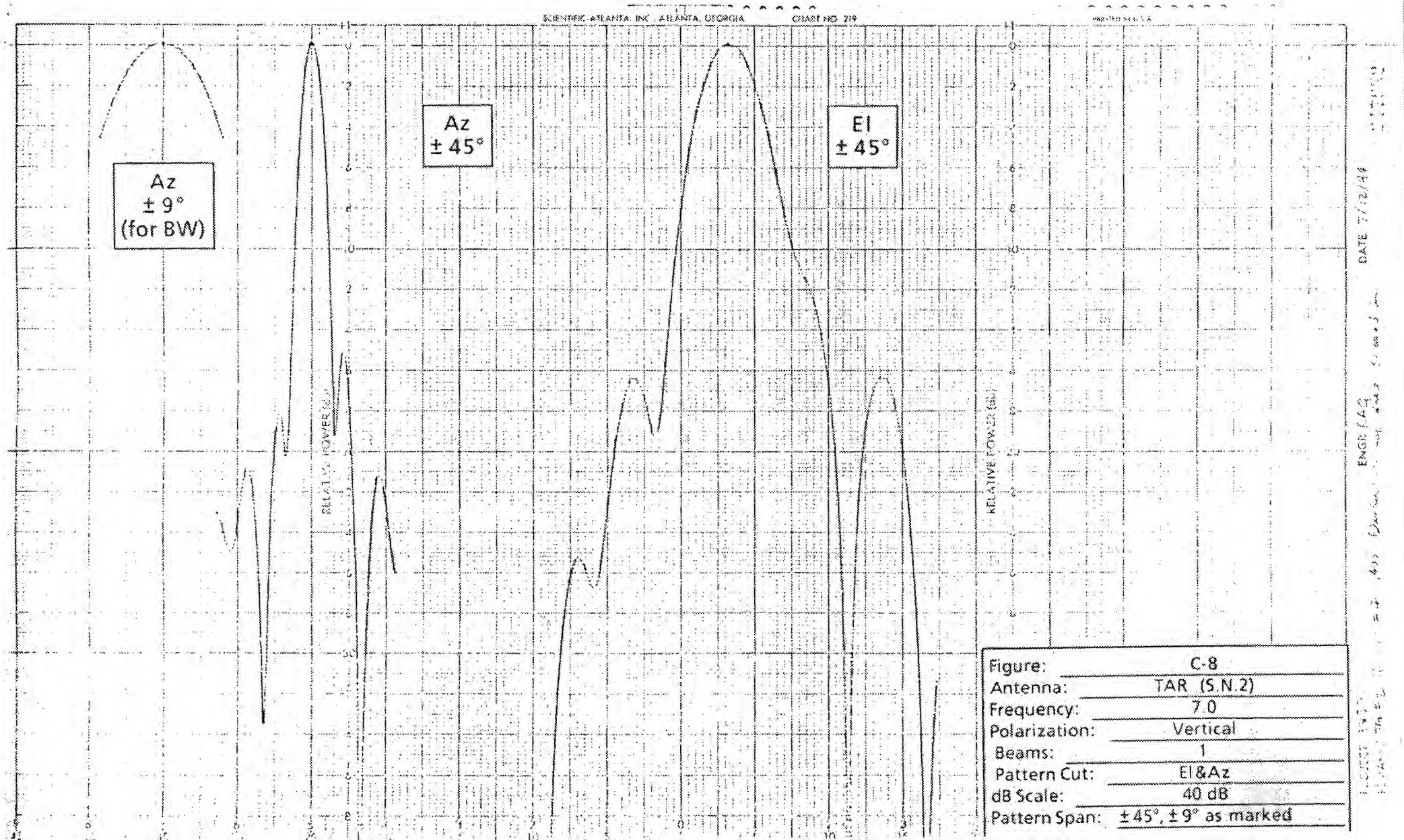


Figure:	C-8
Antenna:	TAR (S.N.2)
Frequency:	7.0
Polarization:	Vertical
Beams:	1
Pattern Cut:	El&Az
dB Scale:	40 dB
Pattern Span:	±45°, ±9° as marked

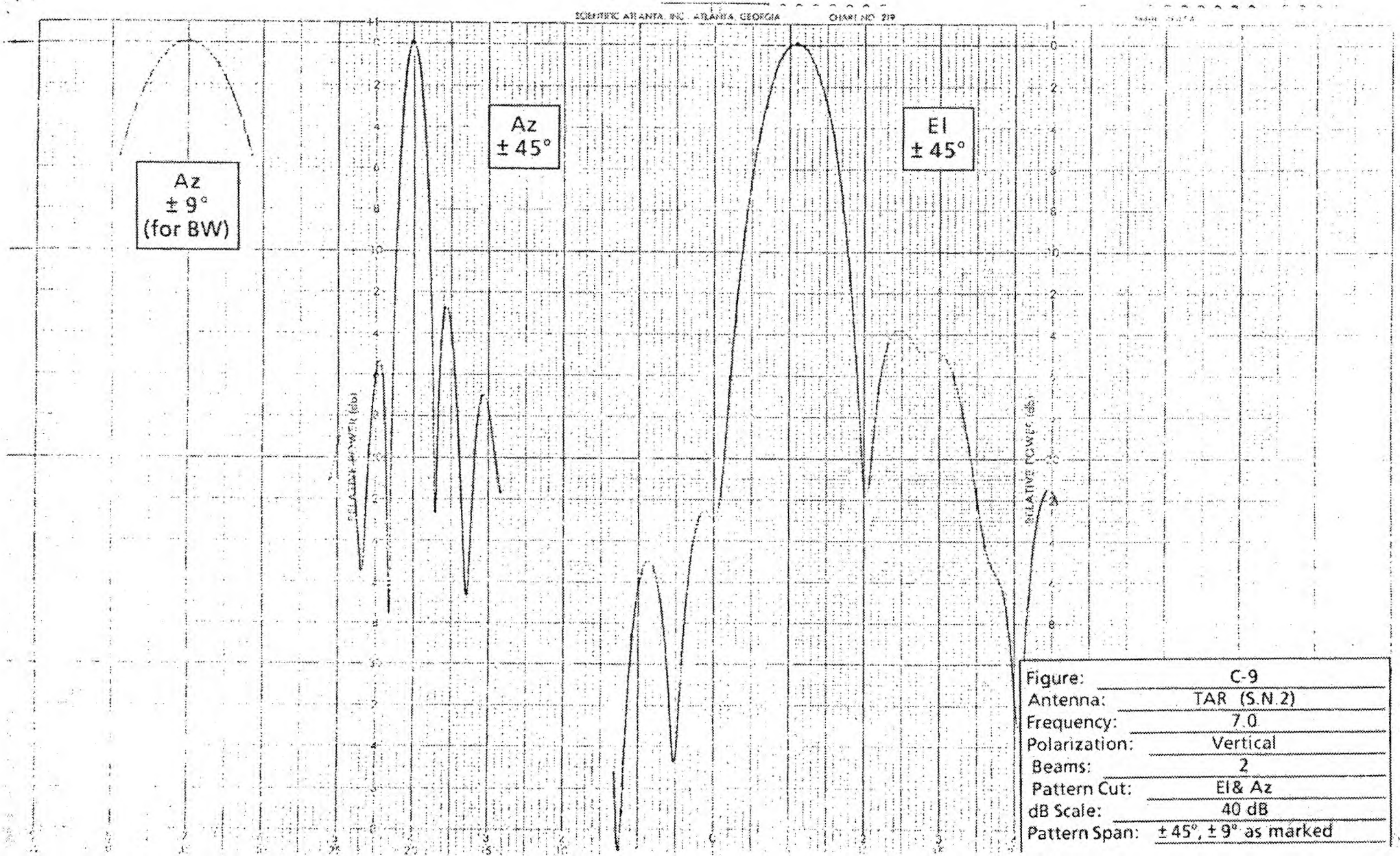
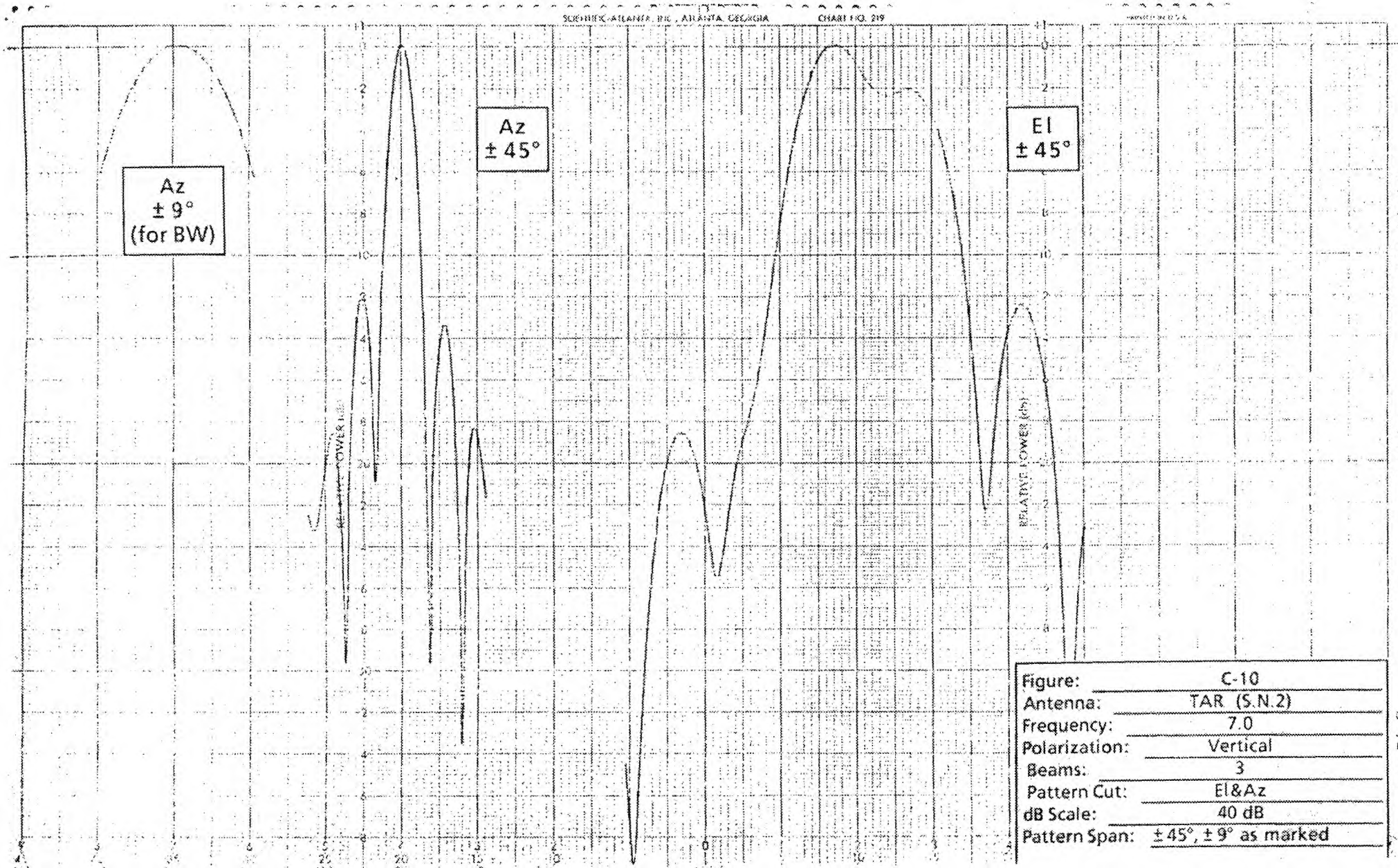


Figure:	C-9
Antenna:	TAR (S.N.2)
Frequency:	7.0
Polarization:	Vertical
Beams:	2
Pattern Cut:	El& Az
dB Scale:	40 dB
Pattern Span:	± 45°, ± 9° as marked


Az
± 9°
(for BW)
Az
± 45°
El
± 45°
RELATIVE POWER (dB)
Figure: C-10
Antenna: TAR (S.N.2)
Frequency: 7.0
Polarization: Vertical
Beams: 3
Pattern Cut: El&Az
dB Scale: 40 dB
Pattern Span: ± 45°, ± 9° as marked

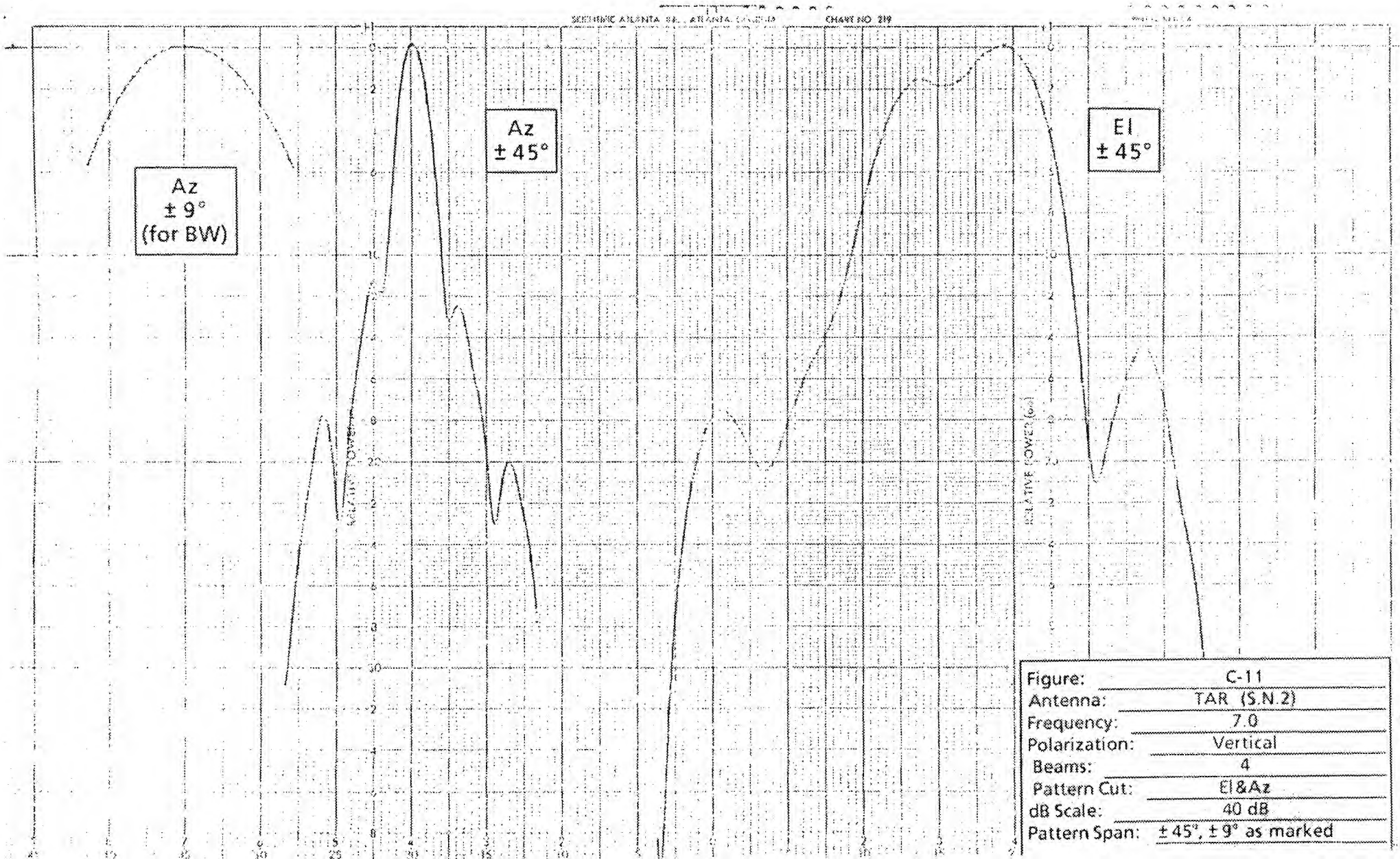


Figure:	C-11
Antenna:	TAR (S.N.2)
Frequency:	7.0
Polarization:	Vertical
Beams:	4
Pattern Cut:	El&Az
dB Scale:	40 dB
Pattern Span:	± 45°, ± 9° as marked

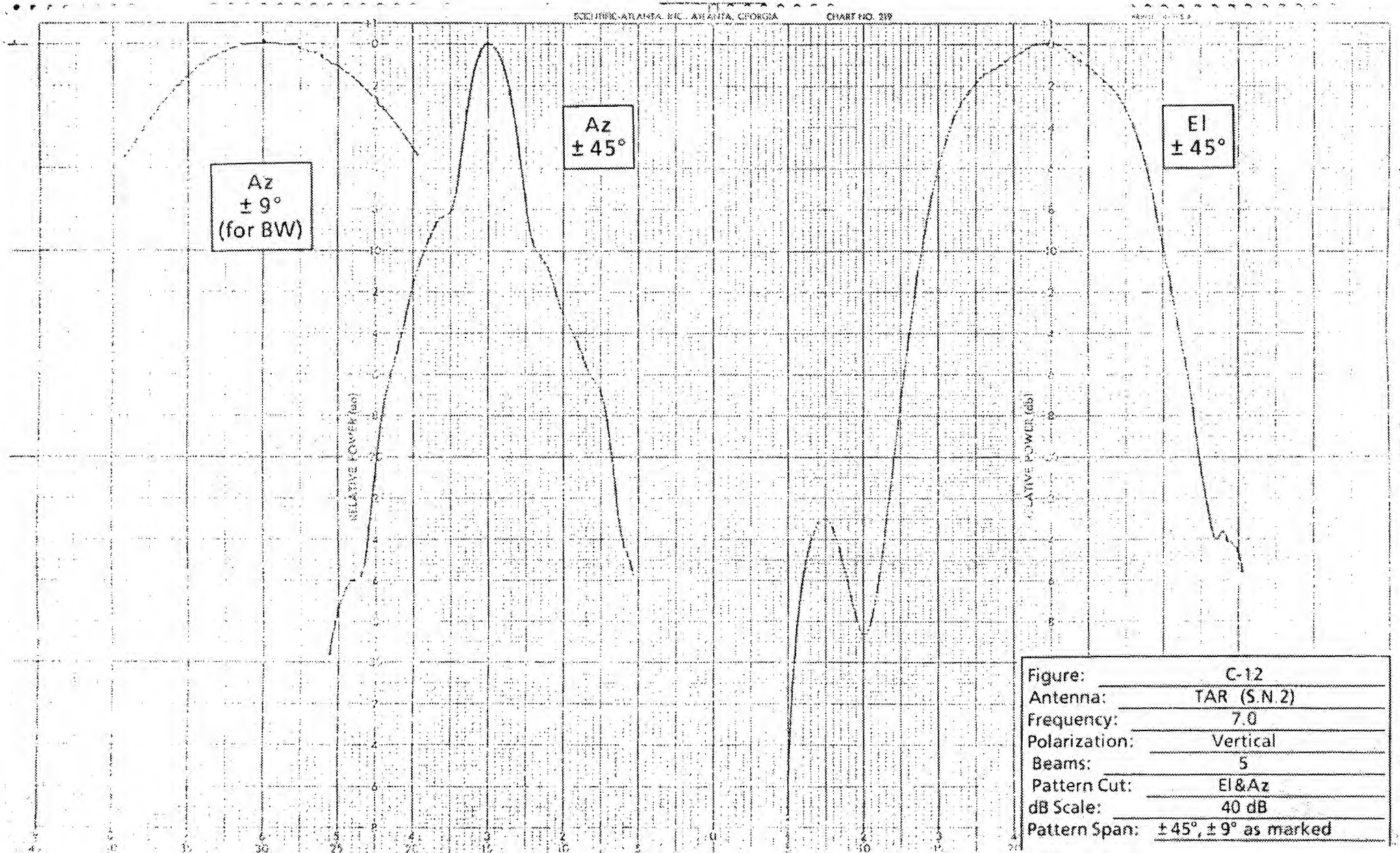


Figure:	C-12
Antenna:	TAR (S.N.2)
Frequency:	7.0
Polarization:	Vertical
Beams:	5
Pattern Cut:	El&Az
dB Scale:	40 dB
Pattern Span:	±45°, ±9° as marked

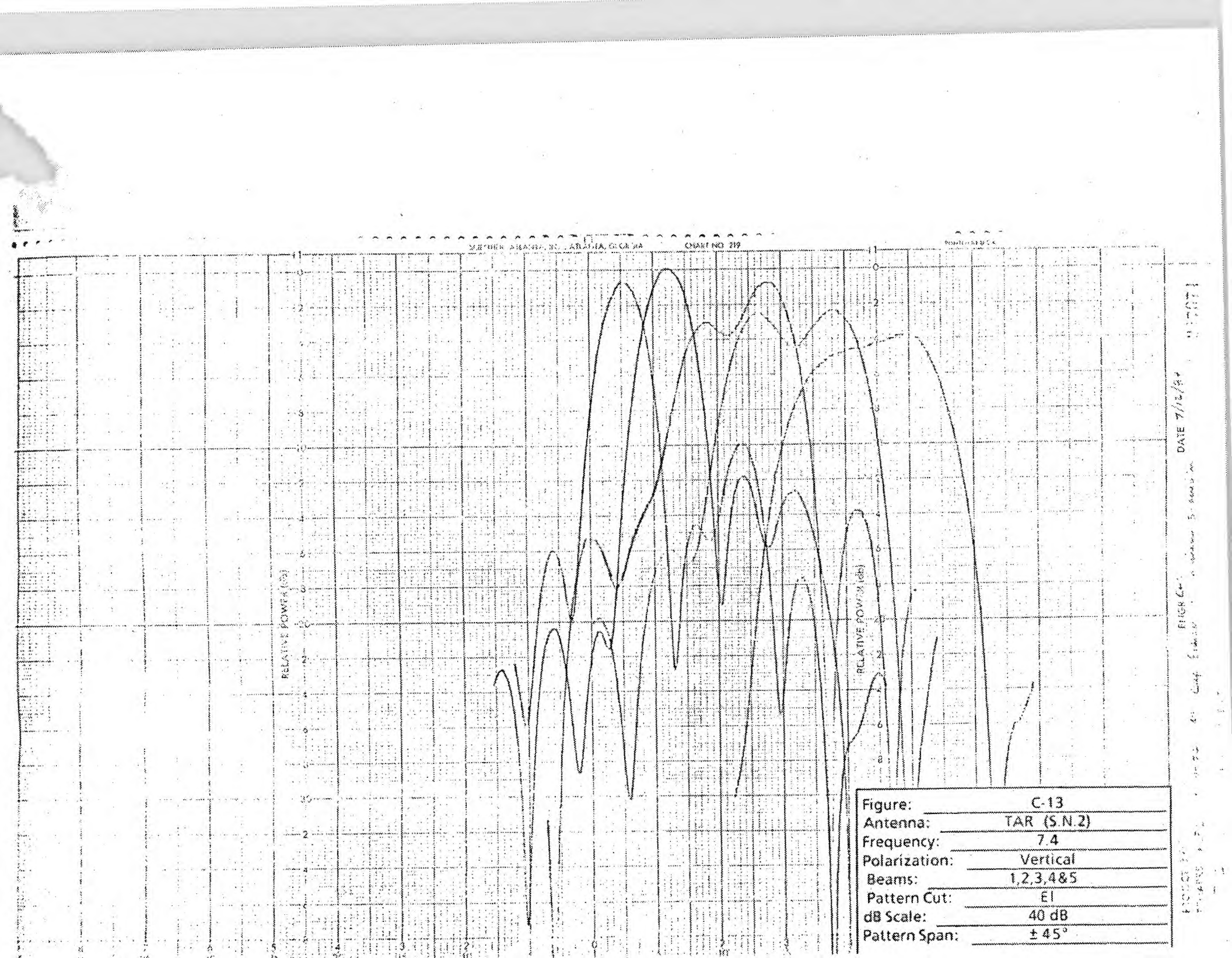
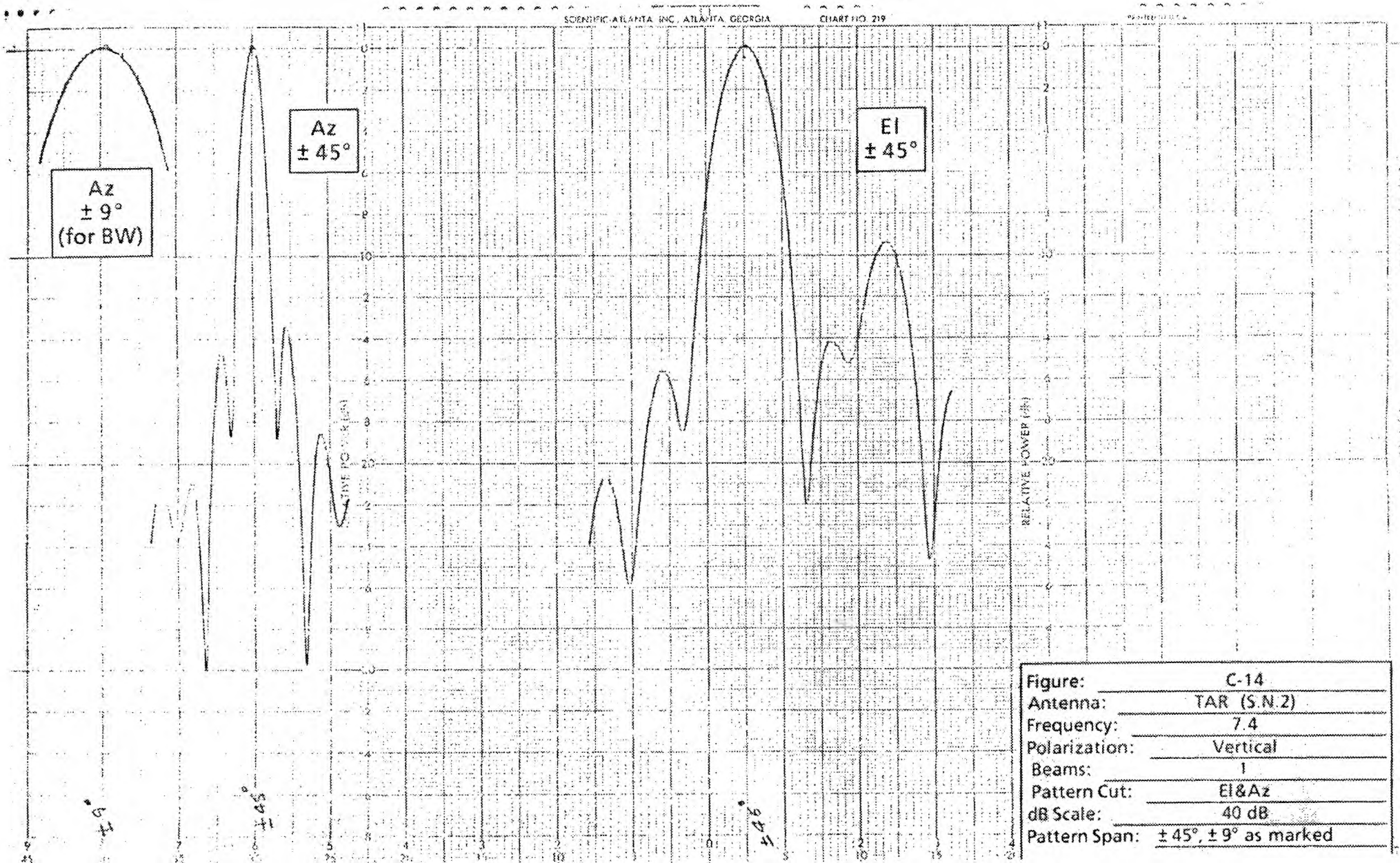


CHART NO. 219
RELATIVE POWER (db)
RELATIVE POWER (db)
DATE 7/12/84
Figure: C-13
Antenna: TAR (S.N.2)
Frequency: 7.4
Polarization: Vertical
Beams: 1,2,3,4&5
Pattern Cut: El
dB Scale: 40 dB
Pattern Span: ±45°


SCIENTIFIC-ATLANTA, INC., ATLANTA, GEORGIA
CHART NO. 219
Az
± 9°
(for BW)
Az
± 45°
El
± 45°
RELATIVE POWER (dB)
Figure: C-14
Antenna: TAR (S.N.2)
Frequency: 7.4
Polarization: Vertical
Beams: 1
Pattern Cut: El&Az
dB Scale: 40 dB
Pattern Span: ± 45°, ± 9° as marked

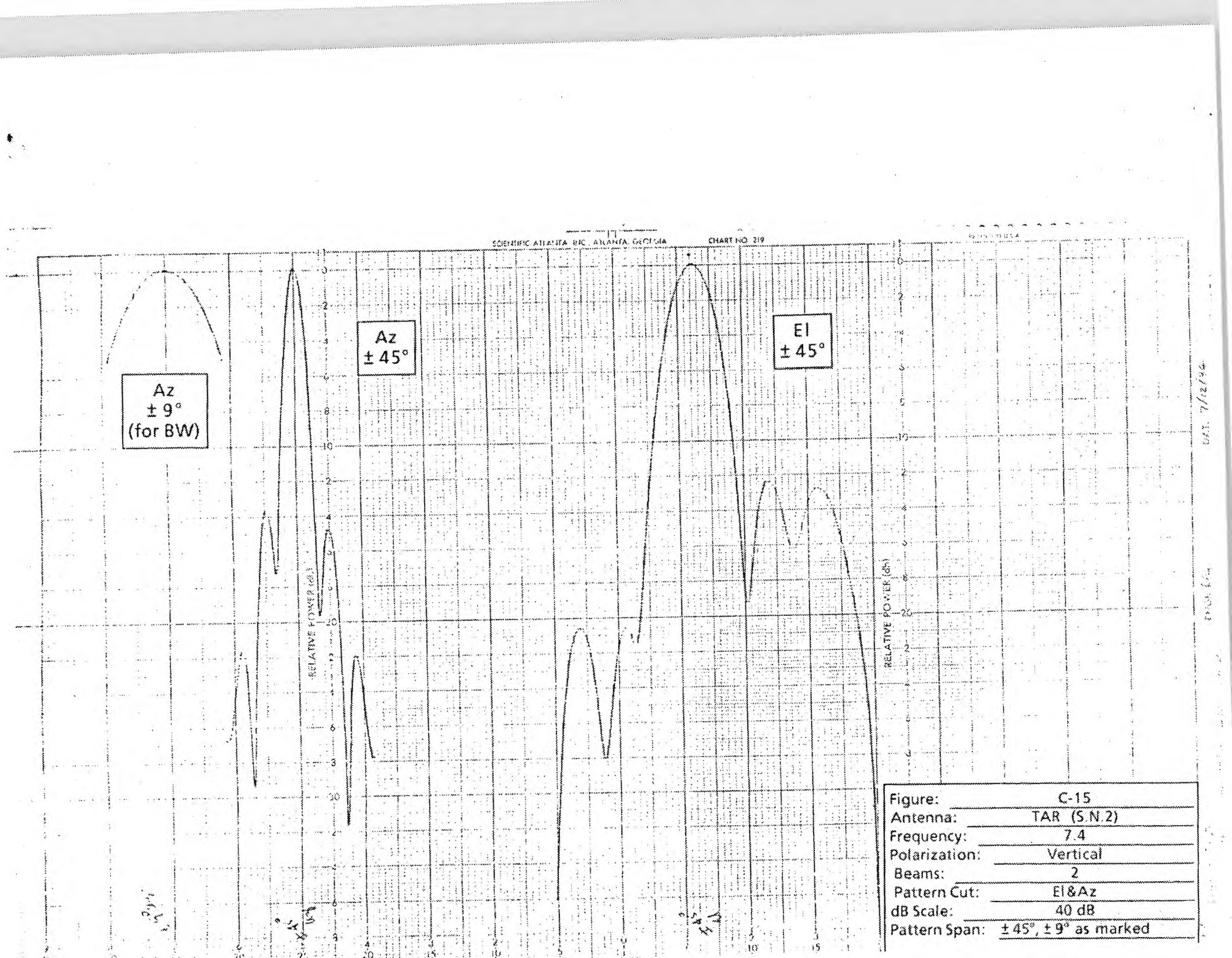


Figure:	C-15
Antenna:	TAR (S.N.2)
Frequency:	7.4
Polarization:	Vertical
Beams:	2
Pattern Cut:	El&Az
dB Scale:	40 dB
Pattern Span:	±45°, ±9° as marked

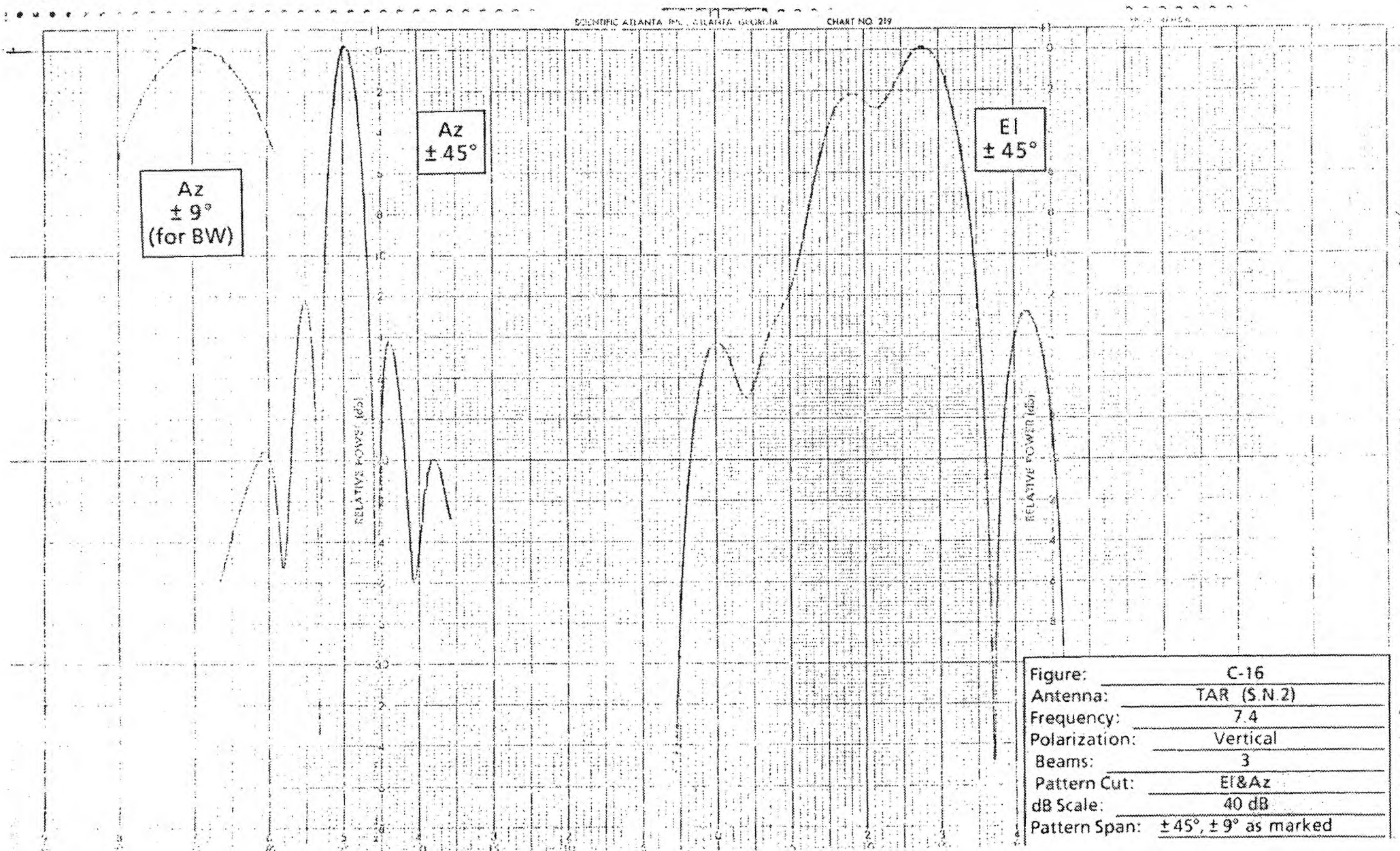


Figure:	C-16
Antenna:	TAR (S.N.2)
Frequency:	7.4
Polarization:	Vertical
Beams:	3
Pattern Cut:	El&Az
dB Scale:	40 dB
Pattern Span:	± 45°, ± 9° as marked

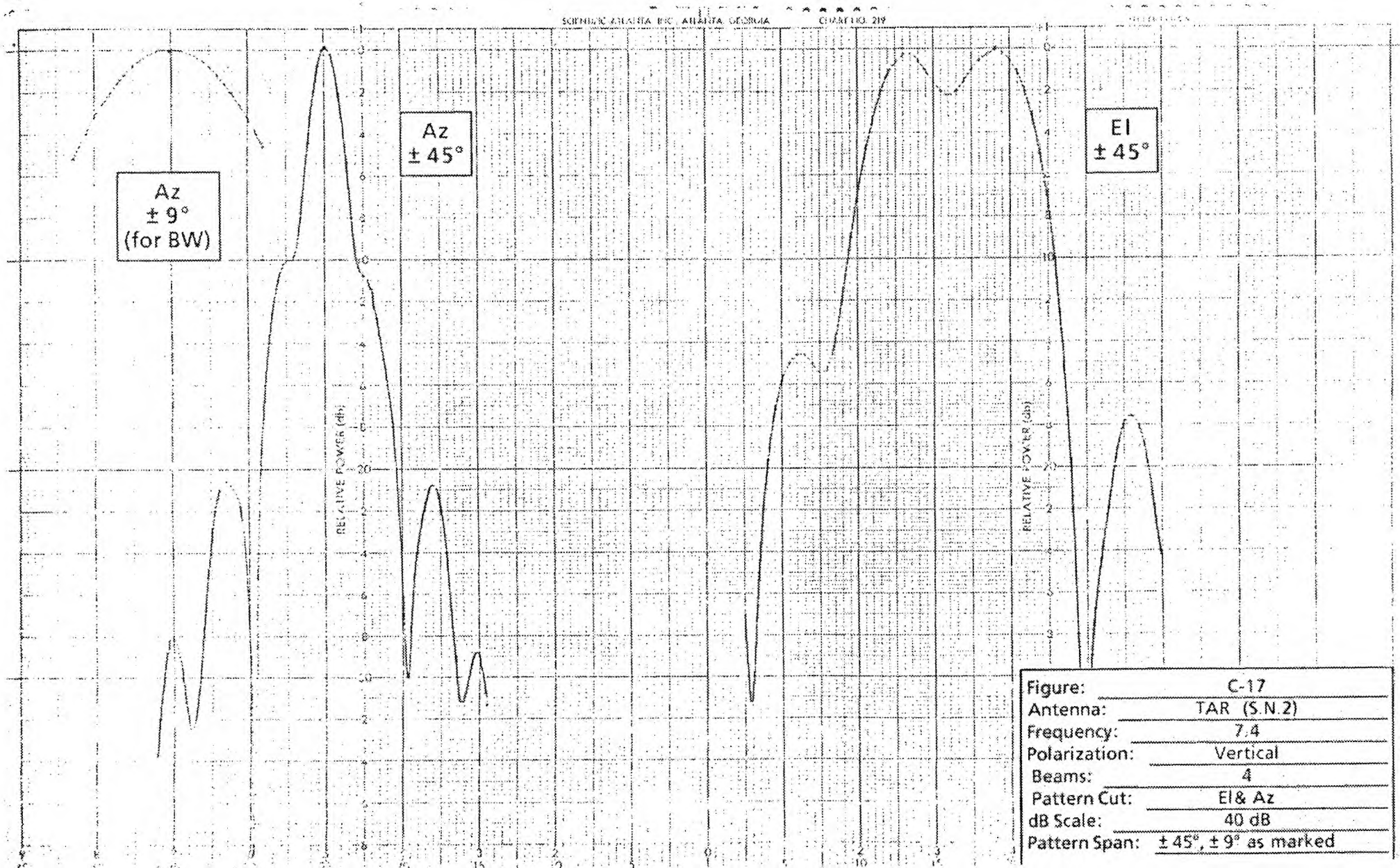


Figure:	C-17
Antenna:	TAR (S.N.2)
Frequency:	7.4
Polarization:	Vertical
Beams:	4
Pattern Cut:	El & Az
dB Scale:	40 dB
Pattern Span:	± 45°, ± 9° as marked

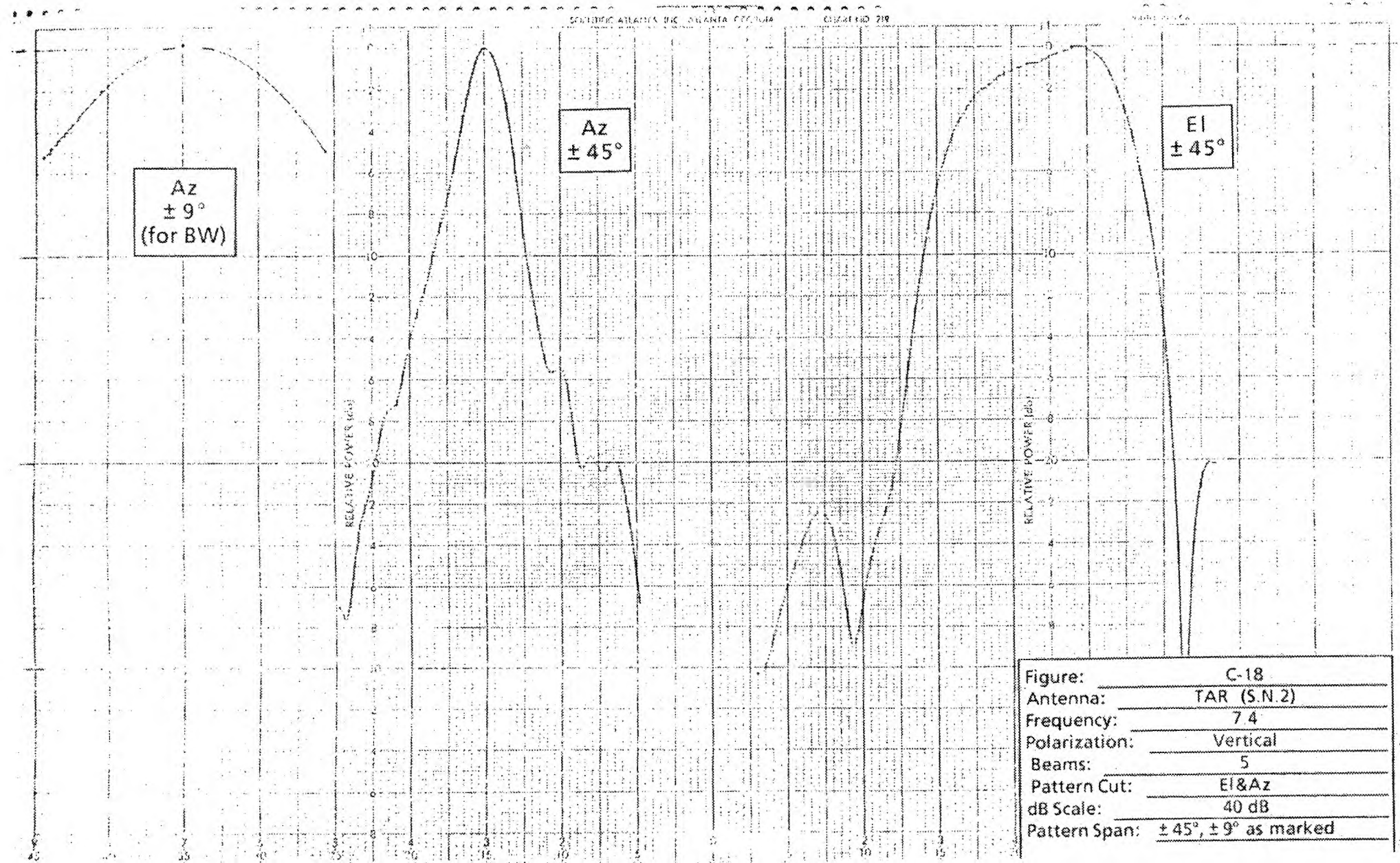


Figure:	C-18
Antenna:	TAR (S.N.2)
Frequency:	7.4
Polarization:	Vertical
Beams:	5
Pattern Cut:	El&Az
dB Scale:	40 dB
Pattern Span:	± 45°, ± 9° as marked

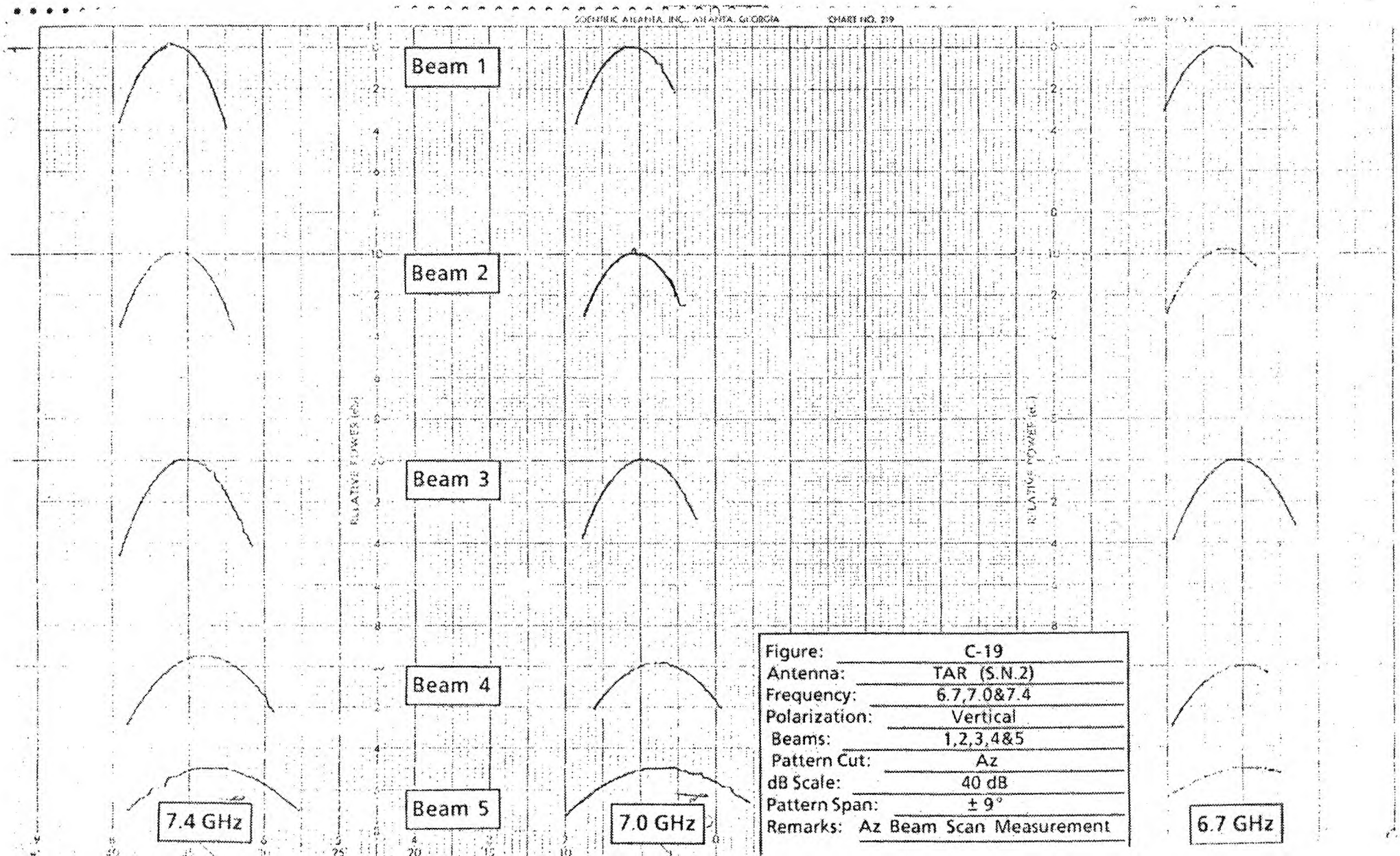
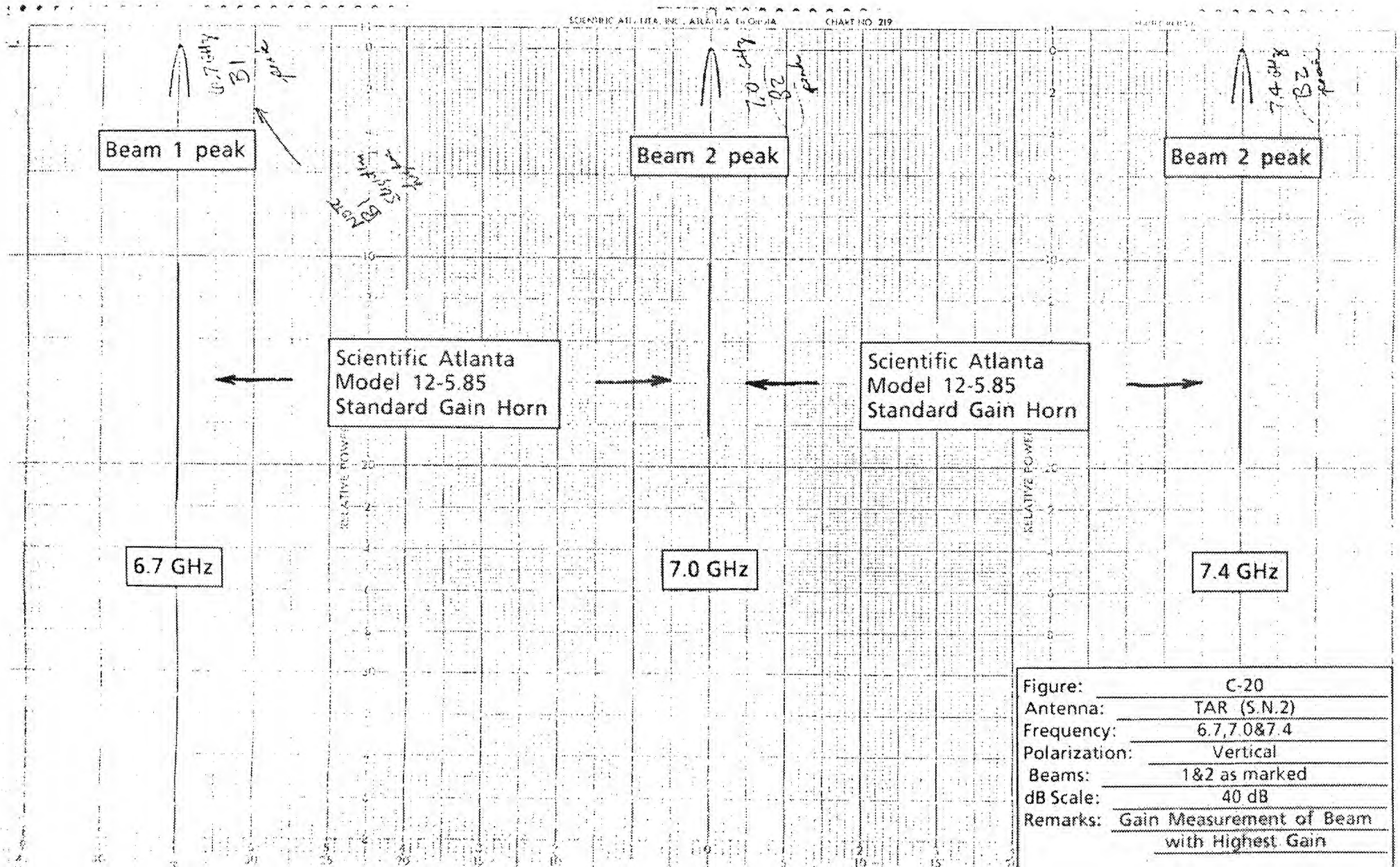


Figure:	C-19
Antenna:	TAR (S.N.2)
Frequency:	6.7,7.0&7.4
Polarization:	Vertical
Beams:	1,2,3,4&5
Pattern Cut:	Az
dB Scale:	40 dB
Pattern Span:	± 9°
Remarks:	Az Beam Scan Measurement


Beam 1 peak
Beam 2 peak
Beam 2 peak
Scientific Atlanta
Model 12-5.85
Standard Gain Horn
Scientific Atlanta
Model 12-5.85
Standard Gain Horn
6.7 GHz
7.0 GHz
7.4 GHz
RELATIVE POWER
RELATIVE POWER
Figure: C-20
Antenna: TAR (S.N.2)
Frequency: 6.7,7.0&7.4
Polarization: Vertical
Beams: 1&2 as marked
dB Scale: 40 dB
Remarks: Gain Measurement of Beam with Highest Gain